
STC Technical Report 3145

Management Organization for Army Weather Programs and Support Functions

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Contracting Officer's Representative: Ms. Joni Jarrett

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13. ABSTRACT (Maximum 200 words) This report records the results of the investigators' review of weather support management within the U. S. Army, both recently and briefly over the past 50 years. In its essence, the report, abbreviated at the Army's request, describes a long-term absence of a positive weather culture that has engendered a failure to use weather data and forecasts as helpful information, a force multiplier, a weapon. While STC investigators identified pockets of enthusiasm and evidence of some exciting progress, the overall configuration of Army weather support was peppered with a lack of direction, little soldier involvement, weak planning, and aperiodic cooperation. This report offers a solution within the constraints of today's budgetary and operational limits. It proposes a temporary Senior Leaders Committee to provide immediate leadership and control with initial actions to clarify responsibilities in AR 115-10/AFI 15-157. It also proposes the use of TRADOC integrated concept teams to address specific, current issues immediately. Although not requested, the authors also documented observations of specific problems in Army weather support, and where reasonable, offered possible solutions. Additionally, the authors recorded some of the problem commentaries of the Army weather community and their suggested solutions. This report has also been presented in soft copy.			
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FOREWORD

Science and Technology Corporation (STC) is pleased to submit this final document entitled "Management Organization for Army Weather Programs and Support Functions" for the satisfaction of the requirements of Subtask 1 of Contract No. DACA76-93-D-0005, Delivery Order No. 0005, statement of work (SOW) entitled "Modernized Army Weather Support and Organization." The document was prepared by Mr. Carl H. Chesley and Mr. Vincent P. Grocki of the STC Hampton, Virginia office and is one of three documents that satisfy the requirements for subtasks 1, 2, and 3 of the contract.

1. The final document for subtask 1, "Management Organization for Army Weather Programs and Support Functions," is included in STC Technical Report No. 3145.
2. The final document for subtask 2, "Verification and Validation of Current IWEDA Rules," is included in STC Technical Report No. 3157.
3. The final document for subtask 3 on Templates, will be included in STC Technical Report No. 3161.

The valuable technical discussions with Ms. Joni Jarrett, U.S. Army Topographic Engineering Center, Mr. Steve Nolan, Office of the Deputy Chief of Staff, Intelligence, Futures Directorate, Analysis and Support Team, are sincerely appreciated. Special thanks also goes to Mr. Lee Page, Office of the Deputy Chief of Staff, Intelligence, Policy Directorate, Battlespace Surveillance Operations Division for his willingness to share his official library of publications and reference files and his personal observations of more than 13 years of Army weather support.

The majority of the data for subtask 1 was gathered and the document written prior to 1 July 1997. Therefore, the authors consider it necessary and warranted that as this report is being finalized to give recognition to the results of some significant events that have had positive impacts in Army weather support. Whether these events were originally coincidence or serendipity is almost immaterial since they give rise to progress and renewed hope.

Specifically, the Deputy Director of Combat Developments, U.S. Army Intelligence Center, Fort Huachuca, Arizona (USAIC&FH), Mr. Mike Powell, assigned an Army Military Intelligence (MI) officer to the Weather Support Team the very week the STC investigators arrived for their initial visit in April 1997. It was a momentous act because in the ensuing months this enthusiastic, superior Army MI officer, Capt. Roy L. Donelson, has obtained needed computer equipment for the WST, increased the

emphasis on weather at the Division Advanced Warfighting Experiment, and has engendered a process of creating Army solutions to Army weather problems. With Capt. Donelson's assistance, the Chief of the Weather Support Team at USAIC&FH, Maj. Michael Corbett, was able to have a block of weather instruction included in the MI officers' formal training curriculum. This modification to the curriculum was accomplished even after the school management had stated that no room was available in the current schedule for weather instruction.

Such successes bode well for Army weather support and reinforce the continuing assignment of an Army MI officer to the Weather Support Team. Such assignments should be a routine part of the overall Army weather support organization.

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LIST OF ACRONYMS

AAA	Army Audit Agency
ACC	U.S. Air Force Air Combat Command
AF/XOW	Air Force Directorate of Weather, Office of the Vice Chief of Staff for Plans and Operations
AFCCC	Air Force Combat Climatology Center
AFSC	Air Force Specialty Code equivalent to the Army Military Occupational Specialty
AFW	Air Force Weather
AGCCS	Army Global Command and Control System
ALO	Air Liaison Officers
AMSS	Automated Meteorological Sensor System
ANBACIS	Automated NBC Information System
ARL	U.S. Army Research Laboratory
ARL-W	U.S. Army Research Laboratory, White Sands Missile Range
ARO	Army Research Organization
ARSPACE	U.S. Army Space Command
ASARDA	Assistant Secretary of the Army for Research, Development, and Acquisition
ASEDP	Army Space Exploitation and Demonstration Program
ASOS/ASOG	Air Support Operations Squadron/Air Support Operations Group
ATACMS	Army Tactical Missile System
AWE	Advanced Warfighting Experiment
AWS	Army Weather Service
AWSO	Army Weather Support Organization
BAT	Brilliant Antiarmor
BCBL-H	Battle Command Battle Laboratory-Fort Huachuca
BDA	Bomb Damage Assessment
BFA	Battlefield Function Area
BFM	Battlescale Forecast Model
BL	Battle Laboratories
BWO	Battlefield Weather Office
C&GS	Command and General Staff College
CAC	Combined Arms Center

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CD	Combat Development
CI	Counterintelligence
COE	U.S. Army Corps of Engineers
COSCOM	Corps Support Command
CRREL	Cold Regions Research and Engineering Laboratory
CV	Critical Values
CWC	Combat Weather Center
CWT	Combat Weather Team
DA	Department of the Army
DCD	Directorate of Combat Developments
DCSINT	Deputy Chief of Staff for Intelligence
DCSOPS	Deputy Chief of Staff for Operations and Plans
DDR&E	Office of the Deputy Director for Research and Engineering
DO	Director of Operations
DOD	Department of Defense
DTLOMS	Doctrine, Training, Leader Development, Organization, Materiel and Soldier
DTSS	Digital Topographic Support System
FORSCOM	U.S. Army Forces Command
HLA	High Level Architecture
HQ	Headquarters
HQ USAF/XOW	Director of Weather, Office of the Vice Chief of Staff, Plans and Operations, Headquarters United States Air Force
HQDA	Headquarters Department of the Army
HUMINT	Human Intelligence
ICT	Integrated Concept Team
IMETS	Integrated Meteorological System
IMETS II	Integrated Meteorological System Block II
IMINT	Imagery Intelligence
INSCOM	Intelligence and Security Command
IPB	Intelligence Preparation of the Battlefield
IPT	Integrated Product Teams
IWEDA	Integrated Weather Effects Decision Aid
MAA	Mission Area Analysis
MACOM	Major Army Command

MAJCOM	Major Air Force Command
MASINT	Measurement and Signal Intelligence
Met Plan I	Meteorological Plan for Action
Met Plan II	Meteorological Plan for Action Phase II
MI	Military Intelligence
MI OBC/OAC	MI Officer Basic and Advanced Courses
MIOAC	MI Officer Advanced Course
MIOBC	MI Officer Basic Course
MOU	Memo of Understanding
MTOE	Modified Table of Organization and Equipment
NEXRAD	Next Generation Radar
NGIC	National Ground Intelligence Center
NSA	National Security Act
NTC	National Training Center
OAC	Officer Advanced Course
OBC	Officer Basic Course
OTW	Owning the Weather
PACAF	Pacific Air Forces
PC	Personal Computer
PM	Program Managers
POC	Point of Contact
PUP	Primary Users Port
RDTE	Research, Development, Test and Evaluation
ROC	Required Operational Capability
ROTC	Reserve Officer Training Corps
SADARM	Sense and Destroy Armor
SI	Systems Integrator
SIGINT	Signal Intelligence
SLC	Senior Leaders Committee
SME	Subject Matter Experts
SOW	Statement of Work
STC	Science and Technology Corporation
SWO	Staff Weather Officer
TAOS	Total Atmosphere and Oceanographic System

TCDC	Tactical Commanders Development Course
TDA	Tactical Decision Aid
TEC	U.S. Army Topographic Engineering Center
TECOM	U.S. Test and Evaluation Command
TESS	Tactical Environmental Support System
TOE	Table of Organization and Equipment
TRADOC	U.S. Army Training and Doctrine Command
TRADOC HQ	U.S. Army Training and Doctrine Command Headquarters
TSM	TRADOC System Manager
TWESO	TRADOC Weather and Environmental Support Office
UCMJ	Uniform Code of Military Justice
USAFAS	U.S. Army Field Artillery School
USAFE	U.S. Air Force Europe
USAIC&FH	U.S. Army Intelligence Center and Fort Huachuca
USAICS	U.S. Army Intelligence Center and School
USAREUR	U.S. Army Europe
USARPAC	U.S. Army Pacific
USARSOC	U.S. Army Special Operations Command
WENEFO	Weather and Environmental Effects Office
WES	Waterway Experiment Station
WETM	Air Force Weather Team
WFLA	Warfighting Lens Analysis
WS	Weather Squadron

EXECUTIVE SUMMARY

One of the major nagging problem areas in Army weather support has been the fragmentation, decentralization, and lack of coordination and cooperation among the joint Army and Air Force elements providing the support. In an effort to address this documented issue an AR 5-5 study was proposed and ultimately awarded to Science and Technology Corporation (STC) in December 1996. It was to be a 1-year effort with the primary task of identifying "an adequate management organization and charter to manage Army weather programs and support functions." However, after approximately 5 months of effort by STC the government decided that effort directed toward the organization and management objective would cease after approximately one-half of the study time had elapsed. The remainder of the study would concentrate on two new subtasks designed to be of more immediate benefit to the warfighter. This document deals with the original organizational issue.

Three primary factors were identified as being key considerations in the development of potential solutions. First, the history and current fragmentation of the organizations providing weather support to the Army by two Services and their several Major Air Force Commands and Major Army Commands create an atmosphere for the development of a culture in the Army that does not highly value weather and a culture in Air Force weather that does not value providing weather support to the Army. Outside influences, such as a decreasing budget for the Department of Defense, are limiting available resources while the Army is continually setting more sophisticated goals for its soldiers and its exploitation of technology, and thereby expanding their weather requirements. Such influences are exerting force in opposing directions. Finally, changes in the application of current management theories dealing with organization design and redesign and the availability of new Army management tools make the rethinking of organizations and their purpose a practical solution.

In considering possible solutions the STC investigators ranged far and wide but tried to maintain some degree of reasonableness. Solutions such as "only fight on dry, calm, warm, and sunny days" were easily discarded. Four major solutions were identified: Option 1, Establish a formal Army Weather Support Organization; Option 2, Give all responsibility to the Air Force; Option 3, Establish an Army Weather Service at the Aviation Center; Option 4, Do nothing, leave everything as is.

Tolstoy wrote, "I know that most men, including those at ease with problems of the greatest complexity, can seldom accept even the simplest and most obvious truth if it be such as would oblige them to admit the falsity of conclusions which they have delighted in explaining to colleagues, which

they have proudly taught to others, and which they have woven, thread by thread, into the fabric of their lives.”¹ History shows that both the Army and the Air Force have periodically treated weather support in the Army with benign neglect. Army requests for support have been met with Air Force indifference while individual Air Force efforts atrophy from lack of Army emphasis. The essence of the future of weather support to the Army is simple. There must be a significant change in the military weather cultures. The Army must take weather seriously. And, the Air Force must take the Army’s weather requirements seriously. Army senior leadership must demonstrate high interest, provide direction, and demand performance accountability. Simultaneously, in Air Force Chief of Staff, Gen. Michael E. Ryan’s words, “The Air Force must offer up to our joint force commanders the kinds of forces and the kinds of capabilities applicable to their mission.”² Can both weather cultures change for the better? They must if weather intelligence, a cost effective force multiplier, is to be an integral part of Army doctrine today and in the future.

To make this cultural change a reality, the implementation of Option 1, the establishment of a formal Army Weather Support Organization, is recommended. Use of an immediate, short-term Senior Leaders Committee (SLC), chartered by the Chief of Staff of the Army or as a tier one Integrated Concept Team (ICT) under U.S. Army Training and Doctrine Command (TRADOC) Pamphlet 71-9, will provide a strong foundation for the development of a better Army weather culture. The SLC’s primary function will be the formalization, through AR 115-10/AFJI 15-157, of a lasting joint Service relationship that leverages both Air Force and Army resources more effectively to produce long-term, permanent results. Through the use of the TRADOC ICT³ process, immediate actions can be initiated and completed that will lead to the institutionalization of solutions to the major weather support problems in such areas as doctrine, training, and education. The ICT process is a recognized, cost-effective management tool that can make the necessary changes take place over time.

Without a formalized leadership entity to balance control and cooperation with autonomy weather intelligence will remain the forgotten, broken leg of the Intelligence Preparation of the Battlefield triad. And George Santayana’s quote “Those who cannot remember the past are condemned to repeat it.”⁴ will become the damning epitaph of Army weather support.

¹ J. Gleick, 1987: *CHAOS Making a New Science*, Viking Press.

² J. Katzaman, 1997: Air Force News Service, “New Chief of Staff Settles into Post,” 7 November 1997.

³ U.S. Army Training and Doctrine Command, 1997: *Requirements Determination*. TRADOC Pamphlet 71-9. 7 November 1997.

⁴ G. Santayana, 1906: *Life of Reason*.

1. BACKGROUND

One of the major nagging problem areas in Army weather support has been the fragmentation, decentralization, and lack of coordination and cooperation among the joint Army and Air Force elements providing weather support. In an effort to address this documented issue an AR 5-5 study was proposed and ultimately awarded to Science and Technology Corporation (STC) in December 1996. It was to be a 1-year effort with the primary task of identifying "an adequate management organization and charter to manage Army weather programs and support functions.

The complete statement of work (SOW), contained in Appendix A, provides the objective, background, tasks, deliverables, control procedures, and the government-furnished support for the original AR 5-5 study. The task was issued to STC under an existing contract (contract number DACA76-93-D-0005) between STC and the U.S. Army Topographic Engineering Center (TEC).

However, after approximately 5 months of effort by STC, discussions were held by government officials to change the direction and objectives of the study. It was decided that effort directed toward the organization and management objective would cease after approximately one-half of the study time had elapsed. The remainder of the study would concentrate on two new subtasks designed to be of more immediate benefit to the warfighter. The revised version of the SOW, effective June 1997, is contained in Appendix B. The first new subtask deals with the validation of the critical values and associated rules contained in the Integrated Weather Effects Decision Aid (IWEDA) version resident on the Integrated Meteorological System Block II (IMETS II). The third subtask, to be undertaken after completion of the first two subtasks, deals with the preparation of an initial list of weather templates to be used by weather support personnel and their customers, also to be hosted on IMETS II.

Appendix C contains the STC letter that requested a no-cost extension of the completion date of the entire task to no later than 31 March 1997. The STC request was approved and incorporated into the amendment issued by TEC on 19 September 1997 with the understanding that the organization/management and IWEDA rule validation subtasks would be completed by the original completion date.

1.1 STC APPROACH

STC prepared a Contract Performance Plan⁵ that outlined its basic approach to the completion of the original task and satisfied a contractual requirement of the TEC contract. STC identified three areas key to the development of the required architecture: Army weather support history, outside influences and Army weather culture, and current organizational theory and available Army management tools. Therefore, in order to properly understand the evolution of the current situation and to be able to understand the magnitude of the organizational problems and then recommend a workable solution, STC devoted its initial efforts toward preparing a concise, but accurate historical review of Army weather support. Even though weather support to the Army is primarily provided by the Air Force, this study was not tasked to review how the Air Force was organized to provide that support or how it performed.

As a part of its preparation, STC initially identified several locations as potential sites for visits during the study. As the study progressed it was planned to revise this list in response to newly gathered data. The proximity of TRADOC Headquarters to STC and the relative nearness of the Pentagon in Washington, D.C., provided STC the opportunity early in the study to make several short trips to gather significant background documentation and information. Then STC performed the necessary research and analysis in Hampton, Virginia. Because the length and scope of this portion of the task was reduced by Modification 1 (see Appendix B) many of the originally identified locations were not visited (e.g., U.S. Test and Evaluation Command [TECOM], U.S. Army Space Command [ARSPACE]). Therefore, in some areas data collection was incomplete and the analysis limited or nonexistent as a result. The authors made use of significant contributions from Mr. Lee Page, DAMI-POB, and personnel in other organizations based on their reviews of the initial version of this report published in July 1997. Appendix D contains a list of personnel contacted in the completion of this task.

The STC objective for satisfying this study was to recommend, incorporating historical lessons learned, a permanent weather support organization that would satisfy current requirements, and recognize both limitations and influences in today's budget and organizational environment. The primary objective was never to identify, address, or recommend solutions to specific, nonorganizational issues or problems. However, STC recognized that during the conduct of this study some of these areas would be observed, and they should be considered for inclusion in a separate portion of the final report. Although recognized, no attempt would be made to investigate fully these issues or to provide in-depth analyses or recommendations.

⁵ C. H. Chesley and A. R. Spillane, 1997: *Modernized Army Weather Support and Organization, Contract Performance Plan*. STC Technical Report 3129, Science and Technology Corp, Hampton, Virginia.

1.2 TEAM COMPOSITION

The original STC Management and Technical Team was comprised of three current STC employees and one individual to be hired. Table 1-1 contains the names and position titles of the team members. Very shortly after the award of the original contract, Dr. Spillane resigned from STC. As a result, the hours originally programmed for the him were reprogrammed to the newly hired investigator, Mr. Grocki.

Table 1-1. Team Composition

Labor Category	Name	Support to the Contract
Program Manager	Mr. Samuel L. Eure	Part time
Project Manager/Principal Investigator	Mr. Carl H. Chesley	Full time
Investigator	Dr. Andrew R. Spillane	Part time
Investigator	Mr. Vincent P. Grocki	Part time

1.3 REPORT OVERVIEW

This document summarizes the work completed to satisfy the requirements to evaluate and recommend architectures for an Army Weather Support Organization (AWSO) and includes six sections and five appendices. Section 1, Introduction, provides background information on the approach taken and a review of the objectives of this report. Section 2, History of Army Weather Support, outlines a review of the history of weather support to and within the Army and the Army's weather culture. It details critical background on how today's organizational vacuum developed. Recognizing that the development of an AWSO is constrained by real world influences, Section 3, Outside Influences, presents these constraints, influences, and organizational catalysts. Section 4, Elements of an Army Weather Support Organization provides a review of current resources, prevailing management theory, and management tools institutionally available to the Army. Section 5, Proposed Solutions, presents an evaluation of several solutions. The final portion of the main text, Section 6, Recommendation, presents a solution to the issue of an organization for Army weather support. Five appendices accompany the text: Appendices A-D have been identified in preceding sections; and Appendix E, Additional Observations, contains comments on issues that were observed during this portion of the overall contract.

2. HISTORY OF ARMY WEATHER SUPPORT

The history of weather support to and within the Army and the resultant Army weather culture are two of the major foundation blocks impacting on the development of a viable, productive AWSO to support the Army of the 21st century. Although the National Security Act of 1947 assigned the responsibility for nonartillery weather support to the Air Force, the land combat mission was not well understood by the Air Force and the Army did not clearly state its unique requirements and its need for something other than the standard Air Force airfield forecasts to support its fighting capabilities. Some lanes of responsibilities were defined through an Army-Air Force joint regulation (e.g., the Air Force making weather forecasts and the Army interpreting the effects of the weather on its systems). However, neither side felt prepared to execute its responsibilities. Consequently, interest, support, and enthusiasm for Army weather support vacillated, despite occasional bright spots, from benign indifference ("so what, we can endure anything," expressed by the Army), to malignant disdain ("let's turn in those Army weather support slots, they don't do us any good anyway," expressed by the Air Force). Simply put, the Army weather culture foundation, and, as a result, the AWSO never had a chance to grow and develop. A review of the historical facts will illustrate this point.

2.1 FIFTY YEARS OF ARMY WEATHER SUPPORT

1947-1950s

Only a few short years after the enactment of the National Security Act (NSA) of 1947, which tasked the Air Force with providing weather assistance to the Army, this support was running afoul of the same problems in Korea that it had faced in World War II. Simply put, the Air Force weather teams supporting the Army units in Korea received little logistical and communications support and they had an equally hard time getting the Army to state its requirements for weather support. This lack of cooperation was due in large part to the fact that most Army personnel had little appreciation for what the weather personnel could do for them and how they could make use of the weather information provided by the weather teams.⁶

The first of a long list of studies, surveys, or audits, began early in the 1950s as a "team of experts" descended on Korea and found that "there is a broad lack of environmental appreciation by the Army" with the result that "... environmental forecasting is not only far below the potential possible, but is

⁶ J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 1.

largely unrecognized as of value.”⁷ A slow and sometimes tedious history of revisions to the Joint Regulation governing Army weather support also started about this time. Improvements were made, but they usually lagged behind the organizational changes, weapon system improvements, and doctrinal refinements that were occurring in the Army.

The 1960s

By the early 1960s, Joint and Service publications started to spell out more clearly the concepts, policy, and doctrine necessary for the provision of Army weather support. However, problems still remained, as evidenced by the report of an Army evaluation team when discussing weather support provided to a major 1963 field training exercise. “In summary, the Swift Strike III test report concluded that in general that more reliable weather communications was required below corps level, all authorized table of organization and equipment (TOE) equipment must be available, and AWS [Air Weather Service] people needed more field training.”⁸

The 1970s

The war in Vietnam saw some temporary increase in the interest in weather and weather support but little real change or lasting improvements in how weather was perceived, supported, used, or organized. With the end of the war a new round of studies started, and between 1972 and 1977 at least 13 different studies dealing with weather and weather support took place.⁹ Some were conducted by various contractors and some by military organizations including TRADOC and the U.S. Army Materiel Readiness and Development Command (now AMC). One of the largest studies was the Tactical Environmental Support System (TESS) Report¹⁰ prepared by the U.S. Army Intelligence Center and School (now U.S. Army Intelligence Center, Fort Huachuca, Arizona (USAIC&FH)). Some of the findings and conclusions common to all of these studies and reports were

- no knowledgeable manager
- outdated doctrine and publications

⁷ J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, August 1979, p. 2.

⁸ J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 9.

⁹ *Report of Audit Army Meteorological Activities, 1978*: Audit Report: EC 78-20, U.S. Army Audit Agency, p. 9.

¹⁰ *Tactical Environmental Support System—Short Title: TESS*, 1976: Volume I Executive Summary. Department of the Army Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, Virginia, ACN 18284.

- poor meteorological equipment, forecasting tools, and communications support
- a lack of proper training in the use and effects of weather information

The Army Audit Agency (AAA) Report,¹¹ completed in 1978, documented several major problems in Army weather support. Some of these items included

- dispersion of authority, no single focal point
- requirements for weather support lacking
- adequate requirements for R&D projects lacking
- impacts of weather not taught
- weather effects not available to customer
- critical values not collected during testing

The 1980s

Completion of the AAA report also signaled a major increase in interest and activity. Following much effort by both the Army and the Air Force Staff Weather Officers (SWO) assigned to various Army locations, the Vice Chief of Staff of the Army approved a Meteorological Plan for Action (Met Plan I) in July 1981.¹² The purpose of Met Plan I was to describe broad courses of action for solving the problems identified in the AAA Report.

Only 18 months later, the Vice Chief of Staff of the Army approved the Meteorological Plan for Action Phase II (Met Plan II) that directed TRADOC to establish the TRADOC Weather and Environmental Support Office (TWESO). The TWESO mission "was to serve as the managers within the Army for weather and surface hydrological services to insure consideration of environmental factors in doctrine, training, organization, and materiel development."¹³ By April 1984, TWESO was established at the U.S. Army's Combined Arms Center (CAC), Fort Leavenworth, Kansas, with 11 authorizations. Although directed by MET Plan II to take actions to fill all the authorizations, only six were resourced by HQ TRADOC: O-6 Director, GS-14 and GS-12 meteorologists, GS-13 communicator, GS-9 technical writer/editor, and GS-6 secretary. Then in November 1985, only 18 months after its

¹¹ *Report of Audit Army Meteorological Activities*, 1978: Audit Report: EC 78-20, U.S. Army Audit Agency, 12 June 1978.

¹² J. W. Vessey, Jr., General, United States Army, Vice Chief of Staff, Department of the Army, Office of the Chief of Staff. Letter, "Meteorological Plan for Action," dated 29 July 1981,

¹³ Briefing by Col. G. R. Svoboda, HQ U.S. Army Intelligence Center and School, Fort Huachuca, Arizona, March 1986: Weather Support Requirements. *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19-20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff for Intelligence, Washington, D.C., p. 132.

activation, the Commander of TRADOC directed that TWESO be split into two parts and that four of the authorizations be moved to the U.S. Army Intelligence Center and School (USAICS), now USAIC&FH, leaving the remainder at CAC. The purpose of this move was to provide the manpower spaces necessary to help with the new proponent weather work being levied on USAICS by CAC since USAICS did not have the assets to work the weather issues identified by TWESO. Two spaces, the GS-12 meteorologist and the editor were left at CAC. The editor was converted to a terrain analyst and both positions were put under the control of the CAC SWO who was dual-hatted as the Chief of the Weather and Environmental Effects Office (WENEFO). The TWESO moved to USAICS; the O-6 was downgraded to an O-5; and TWESO eventually became the Battlefield Weather Office (BWO) by the end of 1986.¹⁴

Interest in Army weather support probably reached its post-World War II zenith with the First Army Weather Conference hosted by Headquarters Department of the Army (HQDA) and held in March 1986. The 2-day conference brought together many of the key personnel directly and indirectly involved in Army weather support and many Army weather support customers.¹⁵ The 15 action items identified as a result of the conference are summarized in Table 2-1. The actions items were sent to TRADOC for review and further tasking as appropriate.

Table 2-1. Army Weather Conference Action Items

ITEM	SUMMARY OF ACTION ITEMS
1	Keep the Army and Air Force informed of plans and actions in weather support programs
2	State weather requirements for new systems in original requirements documents
3	Obtain Next Generation Radar (NEXRAD) primary users port (PUP) for Army support locations
4	Ensure requirements documents (e.g., Mission Area Analysis [MAA]) adequately describe weather support deficiencies
5	Link the technical base research closer to the user representatives
6.	Develop a comprehensive plan to use weather in simulations and war games
7	Improve training in all schools in weather effects on operations and weather support procedures
8	Educate Army weather support personnel and affected intelligence officers about the TRADOC requirements process
9	Improve communications among users, schools, and proponents about weather effects and the impacts on operations
10	Staff weather concepts with the private sector
11	Publish new operational concepts as early as possible so policy, regulations, and procedures can be implemented

¹⁴ Personal conversations and discussions with Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.

¹⁵ *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19–20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff for Intelligence, Washington, D.C.

ITEM	SUMMARY OF ACTION ITEMS
12	TRADOC organizations should request and receive assistance to support the Required Operational Capability (ROC) process
13	Develop a manual for weather effects
14	Define proponents for weather support at echelons above Corps (e.g., Doctrine, TOE)
15	Distribute a periodical within the Army to keep personnel (e.g., TRADOC School subject matter experts, users, R&D community, Air Force SWOs) informed of activities

These actions items were incorporated in the TRADOC Weather Action Plan, and coupled with strong General Officer support, resulted in the achievement of several successes. These successes included approval of the IMETS, start of the SWO indoctrination course, and the publication of new weather support doctrine. However, many of the original action items remain valid today and other new ones have appeared.

Late 1980s and the 1990s

Shortly after the First Army Weather Conference, TRADOC again approved a change to the weather management structure, and in December 1986 converted the TWESO at Fort Huachuca to the Battlefield Weather Office (BWO). The BWO charter included the comprehensive missions and functions of the TWESO. TRADOC also issued guidance that the BWO be maintained as an independent office. However, in August 1988 USAICS restructured the BWO declaring that the BWO would remain the weather focal point and proponentcy office. The BWO was later disbanded in 1992, assigning the personnel to separate USAICS directorates. And although the TWESO and BWO organizations were flawed, limited by a "stovepipe" mentality, internal personality disputes, and a lack of a real weather culture in most of the Army, a 14-year Army manpower contribution to weather proponentcy ended. Army weather activities reverted to their pre-1978 status with no centralized management and no dedicated Army staff. General Officer Steering Committee meetings held during this period attempted to continue the senior leadership interest in Army weather support. However, the surge of interest waned and the momentum was soon lost.

Army weather support entered the 1990s with Army civilian nonresearch-related meteorologists becoming harder to find. In the mid-1980s the meteorologist spaces at Intelligence and Security Command (INSCOM) and HQ TRADOC were lost. From the early 1990s to the present, the remaining Army meteorologists at CAC, USAIC, and finally, the U.S. Army Field Artillery School (USAFAS) have been eliminated. Today two nonresearch-related meteorologist authorizations remain in the Army, both at the HQDA level, with only one authorization currently filled.

In the 1995–96 timeframe the loss of the meteorologist and three nonmeteorologist personnel at USAIC&FH working part time in various directorates on various weather-related issues was well known and brought to the attention of the Commander at USAIC&FH and the Deputy Chief of Staff for Intelligence (DCSINT). Both MG Thomas and LTG Menoher wanted to keep the proponenty and improve it, but could not provide the additional manpower, based on their overall evaluation of potential payoffs from weather to the Intelligence Community versus the other Intelligence functions—Imagery Intelligence (IMINT), Signal Intelligence (SIGINT), Human Intelligence (HUMINT), and Measurement and Signal Intelligence (MASINT). The weather community had gone to the top and asked for “top-down” guidance and did not get permission to rehire the only meteorologist at the school.¹⁶

Today

The critical mass of Army weather experts that served as a controlling, directing, influencing, interconnected, synergistic organization with lines of control and defined missions and functions has disappeared.

2.2 INTERNAL ARMY WEATHER CULTURE

“I know little about the science of meteorology and certainly nothing about what reliance can be put on it for forecasting in England. But, as the day will soon come when a weather forecast may be a critical factor in an important decision which I shall have to take, I want first-hand experience not just of the forecasts. I want to know my meteorological advisors and what they can do.”¹⁷ This brief statement by General Eisenhower in the early spring of 1944, some 2½ months prior to the D-Day invasion, is the zenith of U.S. Army internal weather culture. General Eisenhower was certainly aware of weather effects. And the Allies were certainly aware of the weather’s value in that they were willing to deny weather information to their own forward line of troops in order to deny it to the enemy.¹⁸ But positive instances like D-Day or Washington’s snowstorm victory at Trenton are isolated events in the Army’s historical use of weather.

¹⁶ Discussions with and comments obtained from Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.

¹⁷ J. M. Stagg, 1971: *Forecast for Overlord*, W. W. Norton & Company Inc., p. 39.

¹⁸ J. M. Stagg, 1971: *Forecast for Overlord*, W. W. Norton & Company Inc., p. 27.

Yesterday's Culture

While of the same frame of mind as Ike, General Arnold, at that time Deputy Chief of Staff of the U.S. Army, expressed his beliefs even more strongly, saying that, "Weather is the essence of successful air operations."¹⁹ With the NSA of 1947, General Arnold took his knowledge and philosophy to the newly formed U.S. Air Force where every pilot is taught about the weather from the first day. At the same time, weather support to the U.S. Army became an Air Force responsibility. The Army did not recognize the advantages of weather support and failed to exploit the potential use of weather information to help decision-makers in ground combat in the same way as the Air Force did. Army missions were different and did not fit the mold of standard Air Force missions, which were airfield to target and return to the airfield. Most Air Force weather forecasters did not know this difference in weather support requirements and, therefore, were not trained to make high resolution large area forecasts of interest to Army commanders instead of local airfield forecasts. This was not unusual nor unexpected. Ground warriors had always endured the weather while aviators learned early in their careers to respect and use the weather to their advantage when possible. The Army, to its detriment, has not learned from history. The lesson from perhaps the greatest sin, that the "Weather is not important until it is important and then it's too late."²⁰ has not been learned.

In the 1950s, despite Chinese Communist/North Korean success mounting major attacks in advance of oncoming Arctic cold fronts and periods of poor flying weather²¹ the Army did not present an updated formal and comprehensive set of support requirements to the Air Force until 1956, some 10 years since its last formal statement.²² During the Vietnam War, the North Vietnamese used bad weather as a cover for offensive actions rendering U.S. Army and Air Force air support ineffective.²³ While the Army made efforts to improve weather support it eventually succumbed to Air Force delay and neglect²⁴ and little changed. The Army made a brief charge at improved weather culture in the early 1980s when it dedicated 11 Army authorizations to weather proponentcy but only filled 6 of them. In 1981, the Vice

¹⁹ *The Magazine for Air Force Weather OBSERVER*, HQ AWS/PA, Scott Air Force Base, Illinois, January 1995, p. 3.

²⁰ The Joint Meteorological and Oceanographic (METOC) Interoperability Team's (JMIT) Process Modeling Findings and Recommendations on Joint Operations, Final Report, Anser, May 1993, page i.

²¹ *Army Tactical Weather*, Headquarters Department of the Army, Washington, D.C., 29 April 1977, p. 5.

²² J. F. Fuller: 1977: *Air Weather Service 1937-1977 An Illustrated Chronology*, Office of MAC History, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 19.

²³ *Army Tactical Weather*, Headquarters Department of the Army, Washington, D.C., 29 April 1977, p. 6.

²⁴ J. F. Fuller: 1979: *Air Weather Service Support to the United States Army, TET and the Decade After*, Office of MAC History, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, pp. 161-178.

Chief of Staff of the Army established TWESO, which became fully operational at the CAC in late 1984.²⁵ Sadly, by 1992, the Army did away with the very weather positions it had created to mold a positive weather culture.²⁶

Today's Culture

This state of affairs continues today. Weather, as a consideration, a subject, a weapon, is not taught in any depth at West Point, in Army Reserve Officer Training Corps (ROTC), at Army Professional Development Schools, or as a core competency in basic or advanced branch schools, save Aviation and to a lesser extent Artillery. Additionally, the Intelligence, Aviation, and Artillery Schools have only very limited communication with one another about weather concerns.

Although military intelligence is defined as weather, enemy, and terrain, and although USAIC&FH is the weather proponent for all TRADOC centers and schools, the advantages of a robust capability to exploit weather intelligence for the tactical advantage of the warfighter has not been well understood in the Intelligence community. As a result the importance and effectiveness/utility of weather has not proliferated through training and doctrine in the Intelligence and other combat and combat service branches. As the TRADOC proponent for weather, the Intelligence community's responsibilities for weather proponenty extend beyond the Intelligence community, they extend to the entire Army.

Yet, even in their own "school house," Military Intelligence (MI) students receive only a cursory exposure to weather, weather effects, or weather technology in the MI Officer Basic Course (MIOBC), the MI Officer Advanced Course (MIOAC), and in the enlisted MI Analyst courses. Various SWOs assigned to USAIC&FH have, in the past, prepared lesson plans for both the MIOBC and the MIOAC and unsuccessfully attempted to have them included in the curriculum for these courses. Senior management at USAIC&FH has continually not rated these courses important enough to include while facing increasing pressure to reduce the student course load.²⁷

During a visit to Fort Huachuca the STC investigators learned of a recent training video that was being developed by USAIC&FH to improve the performance and use of intelligence products and the Intelligence Preparation of the Battlefield (IPB) process by all Army personnel. Weather, one of the

²⁵ *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19-20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff for Intelligence, Washington, D.C.

²⁶ Briefing by Maj. G. Howard, USAIC&FH Weather Support Team, 13 March 1997: *Army Weather Proponenty*.

²⁷ Briefing by Maj. G. Howard, USAIC & FH Weather Support Team, 13 March 1997, *Army Weather Proponenty*, and discussions with Mr. L. Page, DAMI-POB, Washington, D.C., January-November 1997.

basic IPB tenets, was not included. No one sought advice or input from the on-site weather Subject Matter Experts (SME). The resident SWOs were not consulted and only learned of the production of this IPB video because they participated in the STC meeting with USAIC&FH DOTD personnel. Other concurrent training actions that did not include participation by or coordination with the weather proponent office included preparation of a series of intelligence simulators and simulations and the development of a New Systems Training Office.²⁸

The IPB process, according to Army doctrine is the responsibility of everyone in the Army, from soldier to general. Therefore, it should be included in everyone's training. The IPB is listed as one of the 192 common training skills of the Army. As part of this program an exportable training program was being prepared at USAIC&FH DOTD for delivery to TRADOC by 30 June 1997. However, as of the date of the visit by the STC investigators in April 1997 no one had thought to include the SWO in the preparation of this package.²⁹

This lack of culture extends to the Army's R&D process as well. Army Program Managers (PM) do not have meteorologists on their staffs as part of their development team. In Air Force programs, major developments have a staff meteorologist as an adviser. Knowledge of weather limitations is a factor in the development of each aircraft, weapon, and sensor. In Army programs no Army staff meteorologists are available as advisers. The current AR 70-38, Research, Development, Test, and Evaluation of Material for Extreme Climate Conditions, is outdated and does not require the full consideration of real weather conditions in testing programs. Recent draft revisions of AR 70-38 proposed putting a Corps of Engineers (COE) scientist/engineer on the ICT/Integrated Product Teams (IPT) established for new systems and on the PMs' staffs to assist with integrating weather into weapons development. Lack of clear, enforceable guidance to test for adverse weather conditions in DOD Directive 5000 series publications left the draft AR 70-38 unsupported and incomplete. Proposals in the draft AR 70-38 to use COE scientists to be advisers to major programs never were presented to the PMs of major programs.³⁰

In the 1995 to 1996 timeframe the issues of weather support were successfully focused through the Owning the Weather (OTW) concept. Numerous briefings were given and papers written and some successes were achieved. Under the OTW initiatives, HQDA, Deputy Chief of Staff for Operations (DCSOPS), DAMO-FDI, the Systems Integrator (SI) of weather and other Intelligence systems, won the

²⁸ Meeting and discussion with Mr. N. Griffin, USAIC&FH, DOTD, April 1997.

²⁹ Meeting and discussion with LTC H. Phelps, USAIC&FH, DOTD, April 1997.

³⁰ Comments from Mr. L. Page, DAMI-POB, Washington, D.C., January-November 1997.

sponsorship of DAMI-ZB, MG Kennedy, and was successful in getting BG Rose (ADCSOPS and MG Anderson's (DCSOPS) support for funding IMETS. However, DCSOPS did not support some other weather objectives championed in the OTW initiatives.³¹ The OTW program, originally an Army Research Laboratory (ARL) based initiative, may not be continued.

Weather has had significant participation in the recent Task Force XXI and Division XXI exercises, both part of ongoing Army advanced warfighting experiments. Proactivity from both ARL-W and ARSPACE personnel has led to successful demonstrations of emerging weather technology; IMETS II and tactical weather satellite receiver sets are examples in an Army Force XXI environment. Lessons have been learned by a few; they must now be applied to the many, and the weather culture of the Army changed.

Air Force Culture

A contributing factor to the Army's overall weather culture comes from the Air Force. The Air Force has historically placed a higher priority on its support to Air Force customers concentrating most of its technical development efforts on improving airfield forecasts, enroute, and large-scale weather phenomena at the expense of the battlescale forecasts needed by the Army. In addition, Air Force weather personnel have had a hard time learning about Army weather support because only limited training was available and they were not encouraged to choose Army weather support as an area of specialization.

On the other hand, the Air Force of today considers the state of the atmosphere and space environment an essential element of Air Force planning and operations. Commanders are directed to integrate the impacts of the atmosphere and space environment into strategy, tactics, operations, and systems.³² To illustrate the point, the Air Force has changed the weather AFSC (Air Force Specialty Code equivalent to the Army Military Occupational Specialty) from a support role designation to part of the operations area. The Army must be just as forceful if for no other reason than weather effects must be available to every commander who orders the warfighter to take or hold ground. The commander must know whether or not all the sophisticated Army weapon systems (e.g., ER-MLRS, M1A1, Comanche) will be adversely affected by weather just when they are needed to assure victory or protect human resources. That is the minimum weather culture the Army must achieve for itself.

³¹ Comments from Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.

³² *Weather Atmospheric and Space Environmental Support*, Air Force Policy Directive 15-1, HQ USAF/XOWP, 13 October 1993, para. 1-1.

2.3 SUMMARY

Today the modern U.S. Army has not availed itself of the advantages of weather effects as a means of amplifying efforts to develop, protect, sustain, and project the Force. The Army has not fully integrated weather effects into strategies to fully exploit modern technologies, gain information dominance, shape the battlespace, and execute decisive operations improving the chances of victory. In short, the Army has never properly educated itself at the institutional level as to the importance of weather and weather effects.

Progress at changing the Army's weather culture has been made, in sporadic leaps, and often driven by technology. Usually small pockets of people have valiantly fought to introduce into and/or justify weather and weather culture in various portions of the Army's life. Successes were made, but advocates transferred, organizations were disbanded, priorities reordered, and weather support rode the roller coaster of interest without the strong broad base of interest and belief in weather. What is needed is an organization that will capture the lessons learned, build on the successes, serve as the institutional weather memory of the Army, and lead the change of the Army's weather culture.

3. OUTSIDE INFLUENCES

In addition to history and culture, outside influences, over which this study really has no control, also impact the options that are available for developing an AWSO and increasing the use of weather and weather effects in the Army. Three primary outside influences will be discussed in this section. The Federal budget and consequently DOD resources are becoming more stringently limited and as such the potential options for a weather support organization are restricted. Second, the Army's plan for the future, Force XXI, is setting technologically higher standards with more sophisticated requirements for weather support to be provided to more educated and better trained soldiers. Finally, weather support from the Air Force has always had a strong orientation toward support to aviation operations. Now, along with a major Air Force Weather (AFW) organizational reengineering taking place, about 40% of these Air Force assets are dedicated to Army support.

3.1 FEDERAL BUDGET AND RESOURCE CUTS

The U.S. military has always had a history of increases and decreases in its personnel authorizations and available resources. Weather support has been no different. "Indeed, the Army had a nucleus of people working in meteorology—over twice as many as AWS [Air Weather Service] devoted exclusively to Army support! In 1968 approximately 3000 men and women were engaged in meteorological service or support to the Army—some 1100 Army people in 68 artillery meteorological sections (including 500 in Vietnam); 900 from AWS; and the balance were Army people on the staffs at various echelons devoted to training, combat studies, and research and development. By comparison, excluding the weather reconnaissance function in both services, the Navy had about 3000 engaged in weather operations, and AWS had 8,100 people assigned—excluding the 900 engaged in Army support.

"In the 1970s, like AWS, the Army meteorological function was pared about one-third until, by October 1975, there were only 376 people in 26 Army artillery met sections. Army funds for meteorological operations and supporting research were also trimmed. Yet, while its expenditures for meteorological operations were only about 4% to 5% of the Air Force's, the Army invested twice as many dollars as the Air Force did for supporting meteorological research—a fact that sometimes captured the eyes of Congressmen wanting to know why the Army sought funds in an area covered by other federal meteorological agencies."³³

³³ J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 86.

The funding and manpower tide changed again toward the end of the decade. By late 1977, the Army had almost 1100 personnel devoted to meteorological support—585 in meteorological research and 485 in supporting operational customers. Its budget similarly increased, with R&D having a US \$13,650,000 budget and operations a US \$7,860,000 budget.³⁴

By 1986 the percentage of Air Weather Service resources devoted to Army weather support had grown to approximately 23%, including active duty, AWS civilians, and Reserve and Air National Guard personnel, from the 9–10% of the early 1970s.³⁵ In 1986, the Army was only devoting slightly more than 870 full- and part-time authorizations to weather support: 364 supporting artillery meteorological sections, 19 in training, studies, and management (the TWESO existed at that time and had 8 authorizations of the original 11 authorizations), and 490 in support of meteorological research and development and meteorological support to other Army R&D.³⁶ By 1997 the 775 Air Force Weather people assigned to support the Army represented about 20% of the AFW complement. The Army positions had been slashed from just over 500 in 1986 to 90 slots in 1997.

Table 3-1 provides funding trends for the three Services during the nineties. The Army has experienced an 11% drop in operational weather funds and a 37% loss in research funding from FY 92 to FY 97, with more decreases forecasted for FY 98. The U.S. Army requested US \$19.7 million in operational support in FY 98, a decrease of about 10% from FY 97 levels. R&D requested US \$12.7 million down from US \$19.4 million in FY 97. On the operational side the major decreases in weather support programs and manpower has leveled off in FY 98 from major decreases over the past few years.

³⁴ J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 89.

³⁵ Briefings by Brig. Gen. G. E. Chapman, Commander Air Weather Service, Scott Air Force Base, Illinois, "A Review of Air Weather Service Support to the U.S. Army", and by Maj. A. Mazurowski, Headquarters Air Weather Service, Scott Air Force Base, Illinois, "Air Weather Service Support to the U.S. Army." In *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19–20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff of Intelligence, Washington, D.C.

³⁶ Briefing by Col. G. R. Svoboda, HQ U.S. Army Intelligence Center and School, Fort Huachuca, Arizona, "Weather Support Requirements." In *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19–20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff of Intelligence, Washington, D.C.

Table 3-1. Funding Trends for the Three Services During the Nineties

	Operational Funds (in US thousands)			Supporting Research Funds (in US thousands)		
	Air Force	Army	Navy	Air Force	Army	Navy
FY 92 ³⁷	551,163	26,688	92,520	46,690	30,683	11,185
FY 93 ³⁸	370,600	35,533	92,516	43,281	28,695	11,400
FY 96 ³⁹	310,560	36,789	95,497	68,587	17,598	13,946
FY 97 ⁴⁰	301,959	23,763	99,419	59,655	19,427	14,647

During the same period the Air Force has decreased operational monies by 45% while the Navy has increased monies slightly by 7%. In the research arena, the Air Force and Navy budgets increased by 28% and 31%, respectively. Although inflation made the apparent funding numbers grow going into the nineties, in fact the downward trend continued.

Without belaboring the point, the Army has shrunk by an almost 30% reduction in total manpower (Active, Reserve, Guard, and Civilian) in the past eight years.⁴¹ Commensurate with that shrinkage was a reduction in operational and research resources for meteorology. While these cutbacks are outside the study's scope, it must be noted that the Army, and the MI in particular, are and will be in fact faced with increasing needs (sophisticated systems' performance) and demands (threat sensitivities) for weather effects information and usage.

3.2 FORCE XXI

"I will tell you, we are using every means available to us to project ourselves into the future ... we are reading everything we can about the world in the 21st century. And then we are trying to create the

³⁷ *The Federal Plan for Meteorological Services and Supporting Research*, Office of the Federal Coordinator for Meteorology, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, Rockville, Maryland, April 1992.

³⁸ *The Federal Plan for Meteorological Services and Supporting Research*, Office of the Federal Coordinator for Meteorology, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, Rockville, Maryland, April 1993.

³⁹ *The Federal Plan for Meteorological Services and Supporting Research*, Office of the Federal Coordinator for Meteorology, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, Silver Spring, Maryland, June 1996.

⁴⁰ "The Federal Plan for Meteorological Services and Supporting Research," Office of the Federal Coordinator for Meteorology, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, Silver Spring, Maryland, June 1997.

⁴¹ *Profile of the Army*, Institute of Land Warfare, Association of the United States Army, Arlington, Virginia, February 1997, p. 20.

worlds of the 21st century and force ourselves into the 21st century.” Statement by General G. R. Sullivan, General, Chief of Staff, U.S. Army.⁴²

Defining Force XXI

The Army has been for the past several years moving forward on its journey toward the 21st century and has initiated a campaign to build the Army of tomorrow—Force XXI. Force XXI will be the transformation of the entire Army of today into the Army of the 21st Century. This will be accomplished through the central and essential feature of exploiting information. Information and digital technologies are creating such a synergistic effect among operating systems, organizations, and components that the Army’s capability will be enhanced by an order of magnitude. Tomorrow’s Army will embody as many Force XXI objectives as technology and lessons learned can deliver.

The technology of the 21st century will both give and demand many things. It will allow vastly improved connectivity between and among all echelons in the Army, greatly improving each unit’s situational awareness and agility. It will also give units more lethal weapons, improve their own survivability and versatility, and allow them to deploy and engage the enemy at an ever increasing tempo. However, technology will require the soldiers of the 21st century to be trained, educated, informed, and motivated to leverage technology to its fullest potential.

The Army will move through a succession of qualitatively improved versions, each newer version linked with its predecessor, as the objectives of Force XXI are achieved. A series of focused, well-designed experiments and operational experiences will provide the environment for the Army in which to learn and improve.

Force XXI will also produce an Army ideally suited for joint operations and fully compatible with the operational systems of the other Services. The interoperability and seamless information connectivity with other elements of the joint force will be its primary characteristics and they are essential for the success of joint operations. In addition, Force XXI will produce the modular forces necessary to allow the Army to generate, project, and sustain force packages for any type of military operation.

Achieving Force XXI

Force XXI will be achieved through execution of the Force XXI Campaign Plan, which incorporates three complementary and interactive efforts. Joint Venture is the first and most important effort and is

⁴² *America’s Army of the 21st Century, Force XXI, Meeting the 21st Century Challenge*, Office of the Chief of Staff, Army, Director, Louisiana Maneuvers, Fort Monroe, Virginia, 15 January 1995.

focused on the redesign of Army operational forces. The second and supporting effort is the reinvention of the Institutional Army, that part that generates and sustains the operating forces. The third part concentrates on the development and acquisition of information-age technologies, particularly the digital communications hardware and related software needed for the information-age battle command. These three complementary efforts will be combined in a joint, overlapping endeavor organized into three phases. Phase I will be designed to examine the issues of how brigade and smaller sized units fight, are organized, and are commanded using digital technologies. Phase II will focus on the design of the division. The use of constructive simulations will play a large part in building on the lessons learned in Phase I. Phase III will result in the full integration of information-age technology in the entire Army.

The Future of Force XXI

The results of Force XXI will be the building of the Army of 2010. The Army of 2010 will be based primarily in the continental United States using a combination of airlift and sealift to project the Army to the battlefield of 2010 to execute national military strategy. The battlefield of 2010 will be "digitized," with commanders having unprecedented ability to gather and share tactical information. The leaders of the Army of 2010 will be masters of information technology.

In spite of these advances, the one thing that the Army can never escape is the environment. As equipment becomes more sophisticated, environmental sensitivity increases. In many instances there will be new sensitivities that will require new data, higher resolution, and better techniques. Weather decision aids may be required down to the individual fighting units, even to individual soldiers.

3.3 RECENT AIR WEATHER SERVICE REORGANIZATION

Air Weather Service Prior to 1991

Since the National Security Act of 1947, the Air Force, through the Air Weather Service (AWS), has been providing weather support to the Army. Most of the responsibilities of the AWS have been in the area of providing both garrison and tactical weather support. Taking observations, making forecasts, giving weather briefings, and providing other weather products to various types and levels of Army customers have been the responsibilities of the AWS. The AWS, in most instances, provided the technically trained meteorologists with the requested weather support, and the Army provided most of the logistical, materiel, and communications support needed by the weathermen. The roles and

responsibilities of both Services have been spelled out in several revisions to a joint Army and Air Force regulation.⁴³

Historically, the AWS has been described as a stovepipe command within the Air Force. Once people became technically qualified to become weathermen, observers, forecasters, enlisted or officers, they generally remained within the AWS. Their assignments, and to a great extent for officers, their promotions as well, were controlled by the AWS. Assignments were directed by the AWS and although some "specialization" did occur, weathermen were moved from supporting one of the Major Air Force Commands (MAJCOM) to another and even into Army weather support.

Internally, the AWS was organized both geographically as well as functionally. Within the continental United States, the AWS wings were usually responsible for support to a single MAJCOM. Overseas, weather support was organized geographically with a single weather wing providing support to all Air Force commands in a single theater. Army support, however, was almost always organized functionally. The big difference was that, since 1947, there never has been an AWS wing responsible for Army weather support. Either small units (detachments or operating locations) or larger organizations (squadrons or groups), which are made up of several detachments, were responsible for providing weather support to the Army and were subordinated to an AWS weather wing supporting a MAJCOM. The lack of an Army Support Weather Wing, or equivalent organization, historically has not enabled Army support problems to be resolved at the same level of detail and urgency as solutions identified by AFW wings for Air Force problems.

The weather support provided by the AWS to the Army has historically been oriented to aviation. Responding to officially stated Army requirements, the AWS established weather teams with major Army tactical units, usually at division level and above. These teams provided some staff and planning support to the headquarters' staff but mostly provided support to the division's aviation assets. While tactical units were in garrison and for those Army locations where no tactical unit existed but an Army airfield required weather support, the AWS provided garrison (or fixed base) airfield weather support. In addition to providing this aviation-oriented weather support, the AWS also provided SWO support to certain nonoperational units. The function of these SWOs has been to assist Army military and civilian meteorologists in planning and developing doctrine for weather support to Army organizations. The SWOs have been the resident experts on the technical details of weather and weather support and have assisted Army customers in understanding and stating their weather support requirements. This support

⁴³ AR115-10/AFJ1 15-157, *Weather Support for the U.S. Army*, 30 June 1996.

has historically centered on HQ TRADOC (and its predecessor organizations) and its subordinate centers and schools.

Many of the historical problems in Army weather support (discussed elsewhere in this report) have been exacerbated by the split of responsibilities between the Army and the Air Force. However, some of the problems have resulted from the lack of interest and emphasis placed on Army weather support by the Air Force and the AWS, and on the lack of a real "weather culture" in the Army (outside of the aviation world) as far as understanding how to exploit weather information and support. These situations are also discussed in other portions of this report.

Air Weather Service Post-1991

In April 1991,⁴⁴ the historically recognized, stovepipe command AWS ceased to exist. The single AWS command was divided into three distinct support areas: Functions, Technology, and Policy. With his "one-base, one-boss" initiative, former Air Force Chief of Staff, Gen. M. A. McPeak, gave ownership of the base weather station functions to the owning command.⁴⁵ As a result, the local base weather detachments previously reporting to AWS weather squadrons, now report to the Operations Support Squadron of the host base. Those detachments supporting Army airfields and/or organizations now organizationally belong to the Air Support Operations Squadrons⁴⁶ organic to Army organizations.

Formerly assigned under the then Military Airlift Command, Headquarters Air Weather Service is now a field operating agency that reports to the Air Force Directorate of Weather, Office of the Vice Chief of Staff for Plans and Operations (AF/XOW).⁴⁷ The HQ AWS mission is to provide centralized weather and space environmental services to the Air Force, Army, Joint Staff, and other agencies as required; ensure standardization and interoperability of the AFW; assess the technical performance and effectiveness of weather services provided by the AFW; provide technical advice to all agencies supported by the AFW; and field and sustain weather systems for the Air Force and Army.⁴⁸ **Note:** The HQ AWS is undergoing another change in its location and organization. That change, including a name change to Air Force Weather Agency, is recognized here, but not discussed further.

⁴⁴ "Special Order GA-60 dated 7 March 1991, Effective 1 April 1991," HQ Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, per telephone conversation with Ms. L. E. Wilbur, Air Weather Service Historian, HQ AWS/RMH, 22 May 1997.

⁴⁵ *AWS Observer*, January 1995, p. 12.

⁴⁶ *AWS Observer*, January 1995, p. 22.

⁴⁷ *AWS Observer*, January 1995, p. 12.

⁴⁸ *AWS Observer*, January 1995, p. 11.

Finally, the Director of Weather, Office of the Vice Chief of Staff, Plans and Operations, Headquarters United States Air Force (HQ USAF/XOW) is responsible for planning, programming, and budgeting for weather support; publication of weather support policy and standardized procedures; functional management of the weather career field; and assessment of the technical performance and effectiveness of AFW support.⁴⁹

Now, AFW people assigned to support Army operations no longer have a direct chain through weather channels to arrange, change, and improve weather support to the Army. They must maneuver through the appropriate Air Support Operations Squadron for their Army echelon to address any Air Force related issues (e.g., personnel). For Army-related issues (e.g., tactical equipment), they must move through the Army command structure to the Major Army Command (MACOM), which then in turn must work with the weather staff in their supporting MAJCOM as directed by the Joint Regulation.⁵⁰ These support relationships are shown in Table 3-2.

Table 3-2. Support Relationships for MAJCOMs and MACOMs

MAJCOM	MACOM
Air Combat Command (ACC)	Training and Doctrine Command (TRADOC)
Air Combat Command (ACC)	Forces Command (FORSCOM)
Air Combat Command (ACC)	U.S. Army South (USARSO)
Air Combat Command (ACC)	Other CONUS MACOMs/Reserve Components
U.S. Air Forces in Europe (USAFE)	U.S. Army Europe (USAREUR)
Pacific Air Forces (PACAF)	U.S. Army Pacific (USARPAC)
Pacific Air Forces (PACAF)	Eighth U.S. Army (EUSA)
U.S. Air Force Space Command (AFSPC)	U.S. Army Space and Strategic Defense Command
Air Force Special Operations Command (AFSOC)	U.S. Army Special Operations Command (USASOC)

In an operational combat world percolating at laser speed this mix of various and different types of chains of command is a step backward for providing timely, effective weather support to the Army where timeliness, rapid change, and innovation are the hallmarks of the Army's Force XXI thinking.

Air Force personnel come and go from the Army and bring different levels of expertise to SWO positions, but do not stay long enough (i.e., do not have multiple back-to-back tours) to mature fully and integrate their experience into the war planning and warfighting functions. Since the SWOs move after

⁴⁹ *Weather Atmospheric and Space Environmental Support*, Air Force Policy Directive 15-1, HQ USAF/ XOWP, 13 October 1993, para 1.3.2.

⁵⁰ AR115-10/AFJI 15-157, Table 2-1.

one Army tour, they do not build full understanding of Army operations and therefore cannot offer better ways to integrate weather into the commander's planning and execution system. Army SWOs, who may occasionally do multiple tours, have difficulty getting promoted, even when doing an exceptional job as Weather Squadron (WS) commander (Corps SWO) or WS Director of Operations (DO) supporting major contingencies at deployed locations. This may be because of the lack of time to complete a masters degree in meteorology, or because the "definite promote" recommendations often go to the Air Liaison Officers (ALO) in the Air Support Operations Squadron/Air Support Operations Group (ASOS/ASOG) after realignment of the Air Weather Service in 1991.

Another factor contributes to the lack of a reciprocal culture. Army commanders have operational control of the SWOs by AR 115-10/AFJI 15-157, and control the Air Force weather teams (WETM) in contingencies and war according to FM 34-81/AF JPam 15-127. But the Army commanders do not prepare effectiveness reports on these officers, who are under the Uniform Code of Military Justice (UCMJ) and administrative control of ASOS or ASOG commanders. Finally, the Air Force Weather O-6s, who had been SWOs at all the MACOMs and have interacted with senior leaders, were lost in the transition from the AWS to the ASOS/ASOG and replaced by the ASOG (ALO) O6s. This lack of direct senior-level interaction helps slow development of an Army weather culture. The AF/XOW has restored an O6 at Forces Command (FORSCOM), but it is achieved by overmanning an O5 authorization rather than upgrading an authorization. However, several recent good recommendations have come from this relationship at FORSCOM. The FORSCOM SWO is under the administrative command and control of the ASOG Commander at XVIII ABC, thus reversing the normal Army chain of command.⁵¹

Current Organizational Actions

Currently, Air Force Weather is in the midst of what is called a "reengineering effort." To make the most efficient use of dwindling resources the AFW's basic strategy appears to be to consolidate most Air Force base or Army airfield weather forecasting activities into regional centers. This concept of serving multiple aviation customers from a single location should ostensibly free manpower to fully man combat weather teams (CWT) to train for and execute mobility and contingency responsibilities in support of Army and Air Force war and operations other than war requirements. This result has the potential for placing the proper emphasis on the warfighting mission for the CWT, that is, supporting Army combat units rather than writing forecasts and weather warnings for airfields. As of the issuance of Modification

⁵¹ Discussions with and comments obtained from Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.

1 to the SOW, no final official plans or actions have been published or announced concerning the Air Force's reengineering effort. However, without an active, unified interest in weather support throughout the Army, parochial Air Force interests implemented by an increased Air Force presence could overshadow Army requirements and needs. **Note:** DAMI-POB has been an active participant in many of the ongoing meetings and planning sessions involving Army weather support in the AFW reengineering effort.

3.4 SUMMARY

The realities of the world are that Army weather support is being controlled by two unalterable forces pulling in opposite directions: decreasing Army weather resources available from smaller DOD budgets and increasing weather support required for the Army's more technologically sophisticated Force XXI. However, Army weather support is not without potential solutions to this dilemma. The Air Force Weather's reengineering effort may provide part of the solution through the provision of fully manned CWTs available for full-time weather support to Army tactical customers. However the Army must couple this potentially available Air Force manpower with a rebirth of the Army's internal weather culture by revitalizing its weather-related training, wisely applying technology, and developing a weather support organization that will provide the concept, doctrine, procedures, and guidance necessary to integrate declining Army weather manpower resources to meet the expanding requirements of the Army's Force XXI.

4. ELEMENTS OF AN ARMY WEATHER SUPPORT ORGANIZATION

The significant, recurring problem areas in Army weather support have been the documented fragmentation, decentralization, and lack of coordination and cooperation among the varied elements providing weather support to U.S. Army forces. Beginning with studies conducted in the late 1960s,⁵² the conducting and publishing of the TESS Report in early 1976, and continuing with the "First Army Weather Conference"⁵³ in 1986, the need to have "...closer coordination between all weather/meteorological support units..."⁵⁴ has been formally and officially recognized as one of the major continuing problem areas in Army weather support.

Within today's Army, formal roles and relationships and routine procedures on how to accomplish internal Army weather support activities are not clear. Although formal Army and TRADOC guidance is provided for combat development and other Doctrine, Training, Leader Development, Organization, Materiel and Soldier (DTLOMS) activities, the dual Service responsibilities make it difficult to apply this guidance to the weather operations mission area.

Today's AWSO is smaller and structurally more fragmented than ever before. The people that currently make up the weather support structure probably are more traumatized and self-protective due to the culture shock of downsizing. Therefore, the questions, "Does a real organization still exist?" and "Is an acceptable method available for synergizing the efforts of the remaining resources to ensure that the most effective weather support is provided to the U.S. Army?" need to be answered.

Five key elements of an AWSO will be discussed in this section. First, the existing weather support resources will be analyzed and evaluated. Next, the definition and characteristics of an organization will be reviewed. Third the responsibilities of various parts of the AWSO will be reviewed. Fourth, current theories on organizational design or redesign will be presented. Finally, available Army management alternatives will be summarized to determine the availability of in-house solutions.

⁵² J. F. Fuller, 1979: *Air Weather Service Support to the United States Army TET and the Decade After*, AWS Historical Study No. 8, Military Airlift Command, United States Air Force, Scott Air Force Base, Illinois, p. 153.

⁵³ *Army Weather Support, Proceedings of the First Army Weather Conference*, Laurel, Maryland, 19-20 March 1986, edited by J. R. Davis, Office of the Assistant Chief of Staff of Intelligence, Washington, D.C.

⁵⁴ *Tactical Environmental Support System—Short Title: TESS*, Volume I Executive Summary, Department of the Army Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, March 1976, ACN 18284, p. 17.

4.1 CURRENT RESOURCES

Note: Some data contained in this section may be incomplete or contain some minor inaccuracies because travel and detailed research and analysis were suspended before this phase of the study could be completed.

Today's AWSO is comprised of approximately 1168 authorizations. This includes 393 Army authorizations and 775 Air Force authorizations. Table 4-1 provides a list of all of the authorizations. Of the Army authorizations, approximately 379 are directly involved in research/applications and support to Artillery Units while the remainder (14) provide staff policy, liaison, operational support, and requirements and doctrine development. Within the Air Force complement, the majority of the authorizations (758) are operational weather support personnel. The remaining 17 provide staff and liaison support. Currently, the Air Force is filling its billets at approximately a 74% rate. The exact fill rate percentages were not readily available for U.S. Army Europe (USAREUR) and U.S. Army Pacific (USARPAC); therefore the estimated 74% was applied to estimate the number currently supporting the Army.

Table 4-1. List of Weather Support Billets

Headquarters	Supported Organization	Authorized By/Filled By		Key Mgmt	Ops and Other	Comments
		Army	AF			
HQ DA	DAMI-POB	2/1	1/0	X		Army -- Hiring in progress; Air Force -- Replacement due Summer 97
	DAMO-FDI	1/1	0/0	X		
ASA(RDA)	SARD-ZT	2/2	0/0	X		
TRADOC	Headquarters	0/0	1/1	X		Air Force provided SWO
	CAC	0/0	1/0	X		Air Force provided SWO, retired Aug 97
	USAIC&FH/CD	2/1	3/2	X		Army -- Hired one part-time; Air Force -- One retired May 97
	BCBL-H and USAIC&FH/CD	1/1	0/0		X	Filled by ARL-W
	USAFAS-CD	1/0	0/0	X		Retired 30 Sep 97, not being filled by meteorologist
	USAFAS Met Teams	175/175	0/0		X	
	USA Eng/Chem Centers/School	0/0	0/0	X		Request for Air Force provided SWO being staffed
	Battle Lab, Fort Sill, OK	1/1	0/0		X	Filled by ARL-W
	Aviation Center	0/0	0/0	X		
	Infantry Center	0/0	0/0	X		
	Armor Center	0/0	0/0	X		
	Subordinate Locations	0/0	381/340			Air Force provided garrison weather support
COE	HQ	0/0	0/0		X	
	TEC	1/1	0/0	X	X	

Headquarters	Supported Organization	Authorized By/Filled By		Key Mgmt	Ops and Other	Comments
		Army	AF			
AMC	ARL-A	58/28	0/0	X	X	
	ARL-W	41/41	1/1	X	X	Army - 39 ARL, 1 FA, 1 SC; Air Force - 1 AFCWC
	TECOM	105/105	0/0	X	X	
US Army Med Research Cmnd.		??	??		X	
FORSCOM	Headquarters	0/0	10/7	X		Air Force provided SWO and staff support
	Subordinate Commands	0/0	??		X	Air Force provided operational support
USAREUR	Subordinate Commands	0/0	169/126		X	Air Force provided operational support
USARPAC	Subordinate Commands	0/0	129/96		X	Air Force provided operational support
USARSPACE(F)	Headquarters	1/1	0/0	X		
USARSOC	Subordinate Commands	0/0	79/50		X	Air Force provided operational support
US Air Force Organizations	AFCWC	1/1	??			Army position filled by ARL-W
	AFCCC	1/1	??		X	Army position filled by ARL-W
	AF/XOW	0/0	??	X		Usually provided by part-time support from several individuals
	HQ AWS	0/0	??			Usually provided by part-time support from several individuals
	HQ ACC	0/0	??			Usually provided by part-time support from several individuals
	HQ PACAF	0/0	??			Usually provided by part-time support from several individuals
	HQ USAFE	0/0	??			Usually provided by part-time support from several individuals
TOTAL		393/360	775/623			

However, even with more than 1100 Army and Air Force authorizations, there is no apparent, clearly defined, undeniable organization of these functionally similar weather support authorizations. Table 4-2 provides the locations where some or all of the required key management authorizations are vacant.

Table 4-2. Locations of Vacant Key Management Authorizations

Headquarters	Supported Organization	Authorized By/Filled By		Key Mgmt	Ops and Other	Comments
		Army	AF			
HQ DA	DAMI-POB	2/1	1/1	X		Army - Hiring in progress
TRADOC	Headquarters	0/0	1/1	X		Army POC/SME needed Air Force provided SWO
	CAC	0/0	1/0	X		Army POC/SME needed Air Force provided SWO, retired Aug 97
	USAIC&FH/CD	2/1	3/2	X		Army - Hired one part-time; Air Force - One retired May 97
	USAFAS-CD	1/0	0/0	X		Retired 30 Sep 97, not being filled by meteorologist
	USA Eng. and Chem. Centers and Schools	0/0	0/0	X		Request for Air Force provided SWO being staffed. Army POC/SME needed
	Aviation Center	0/0	0/0	X		Army POC/SME needed
	Infantry Center	0/0	0/0	X		Army POC/SME needed
	Armor Center	0/0	0/0	X		Army POC/SME needed
AMC	ARL-A	58/28	0/0	X	X	

Figure 4-1 illustrates the wide variance in organizations where the Army and Air Force weather support authorizations are located and whether they are full-time or part-time positions. It also illustrates, in a stylized manner, the complicated and convoluted command and control lines connecting them.⁵⁵

For example, the dashed lines in Fig. 4-1 represent functional lines of responsibility for Air Force personnel in support of Army units. The Air Force SWOs/WETMs provide operational weather support to Army operational MACOMs worldwide. In almost every case this is a full-time job by these Air Force personnel and places them under the operational control of the supported Army commander by AR 115-10/AFJI 15-157. The Army commander also has control over the SWOs/WETMs in time of war or contingency according to FM 34-81/AF JPam 15-127.

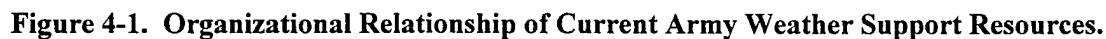
The Army commanders do not, however, prepare effectiveness reports on the SWO who is under the administrative and UCMJ control of an Air Force ASOG or ASOS commander (relationship shown by the dotted lines). The ASOG/ASOS organizations support Army tactical units through a memo of understanding (MOU) initiated by the Air Force. These MOUs are renewed annually and can be withdrawn by the Air Force. It must be remembered that the Air Force is required by law (the National Security Act of 1947) to provide weather support to the Army.

The dashed lines in Fig. 4-1 also represent the functional relationships between the DOW sections at the Air Force MAJCOMs and Army MACOMs they are tasked to support by AR 115-10/AFJI 15-157. However, this is only a part-time job and these staff sections usually only give a small percentage of their time to Army support because of the perception that Air Force support comes first, Army support second. It is necessary, therefore, to look at the basic definitions and characteristics of an organization to see if these loosely aligned, but functionally similar, authorizations can be called an organization.

4.2 IS THE ARMY WEATHER SUPPORT ORGANIZATION AN ORGANIZATION?

Another step in evaluating the current organization of Army weather support and identifying potential changes requires the understanding of the definition, characteristics, and structure of an organization to determine if the current elements are in fact an organization.

⁵⁵ Discussions with and comments obtained from Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.



Definition

A review of a simple definition of the word "organization" taken from a dictionary, "A group of people that has a more or less constant membership, a body of officers, a purpose, and usually a set of regulations"⁵⁶ reveals that the group of weather authorizations apparently does not satisfy some parts of this definition. However, a broader definition, used by Hodge and Anthony in their textbook on organizational theory, states that an organization is "An open, dynamic, purposeful social system of cooperation designed to enhance individual effort aimed at goal accomplishment; consists of the human element, the physical element, the work element, and the coordination element; and transforms resources into outputs for users."⁵⁷ Now this group of functionally similar weather authorizations starts to potentially appear as an organization. Other indicators are also found in the Hodge and Anthony textbook that point to the conclusion that there may in fact be an AWSO. "Thus, an organization can be thought of as two or more people working cooperatively toward a common objective or set of objectives."⁵⁸ However, for this group of individuals to be an effective organization it must also satisfy other rules. "Group activity requires cooperation, else members can find themselves working at cross-purposes and therefore losing the benefits of association. In order to attain this cooperation and so to achieve desired complex goals, some system of structural relationships had to be established. Such a system of group relationships built on and fostering cooperation, then, is basically the meaning of organization."⁵⁹ Again, the AWSO fails to satisfy some of these rules.

Characteristics

Now that an organization has been defined, some of the characteristics or elements of an organization need to be examined. An organization may be thought of as a group of members who have specific duties or responsibilities to perform. However, order is essential and some acknowledged direction, guidance, or management established over the members, as well as cooperation among them, when they perform their roles, or else the potential efficiency or synergism expected from the group will be lost. There are various methods for controlling and guiding the members including the use of

⁵⁶ Webster's *Third New International Dictionary*, G. C. Merriam Co., Springfield, Massachusetts, 1969.

⁵⁷ B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, p. 708.

⁵⁸ B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, p. 8.

⁵⁹ B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, p. 8.

authority and power, communication and control systems, organization and job design, selection and training, reward systems, and appraisal and development.⁶⁰

Hodge and Anthony⁶¹ go on to define power as "... the ability to influence others successfully," while "Authority can be defined as power that has been officially recognized by the organization." Both power and authority are required as components of an organization because they give it the ability to take coordinated actions to initiate the performance of work and to achieve goals. However, in any organization power and authority often exist in a political environment. "Within organizations, politics involves those activities that organization members undertake to acquire, develop, and use power." When viewing an organization from a political perspective, it is important to remember that perception from a political perspective is that of an organization where decisions are based on power rather than authority. In addition, the activities normally associated with politics, such as bargaining and conflict, are vital to the continued good health of the organization. Disputes are bound to arise simply because the informal organization is really a mosaic of several organizations, each trying to protect its own turf. Bargaining is commonplace within this structure and the measure of one's ability to bargain is a measure of that person's power. Decisions that are made can be based on power, authority, or a combination of both. A quick mental historical review of the AWSO's use of power, authority, and politics shows another example of the AWSO satisfying only some of the characteristics of an organization.

Structure and Objectives

The structure of an organization is driven by many factors including the environment in which it must operate, the competency of the people in the organization, the geographic dispersion of its operations, and the diversity of the market that it serves. Therefore, there is no *one* organizational structure for all groups. And assuming that the group can be called an organization, then its structure (i.e., its wiring diagram) is unbounded by any design. That structure, nevertheless, must have some basic objectives if it is to be effective. These objectives include goal accomplishment, encouragement of innovation, flexibility and adaptation, care for the people in the organization, and the capability to

⁶⁰ B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, pp. 14, 15.

⁶¹ B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, p. 17.

facilitate internal coordination, and the formulation and implementation of organizational strategy.⁶² Here again the available authorizations in the AWSO satisfy only some of these factors.

Final Analysis

In spite of all of the positive indicators one is still left with the indisputable conclusion that a true AWSO does not exist. The individual efforts are available, the goals are known, and at times are even striven for, but a truly cooperating, purposeful structure does not exist. Many of the elements in this loose confederation of functionally similar authorizations think more in terms of protecting their own turf and defending their "lanes," then they do of accomplishing the goals and objectives of the Organization.

4.3 CURRENT RESPONSIBILITIES OF ARMY ORGANIZATIONS⁶³

The Army has some classical management tools available because of the vertical command structure within the major commands, but because of the multiple users of weather and general Army perception that the Air Force does it all, the weather programs are not managed with the same degree of interest, direction, and accountability as standard Army functional areas and supporting programs or other TRADOC responsibilities.

TRADOC is the major command concerned with the DTOLMS, which drive much of Army weather support. TRADOC standard procedures have not worked well because weather supports many branches. It is not easy to weigh the value of weather to other branches during standard TRADOC procedures to expend resources on programs, to manage weather programs, to train personnel about weather, or to write weather into doctrine. For example, FM 100-5 has de-emphasized the impact of weather in the last two or three revisions from a terrain and weather chapter to only a few scattered paragraphs.

As part of the shared responsibility to put a WETM in the field, the Army has the lead on Army-Air Force doctrine (FM/AFJPams), provides standard tactical equipment, provides equipment repairmen for standard Army equipment issued under TOE/MTOEs, and programs resources to build the new equipment as required by AR 115-10/AFJ 15-157. The main DTLOMS problem has been the lack of a vehicle to roll up the collective importance of Army weather support requirements into a representative package. As a result tactical user representatives from the Battlefield Operating Systems (BOS) (other

⁶² B. J. Hodge and W. P. Anthony, 1991: *Organizational Theory: A Strategic Approach*, Fourth Edition, Allyn and Bacon, Inc., Needham Heights, Massachusetts, p. 343.

⁶³ Discussions with and comments obtained from Mr. L. Page, DAMI-POB, Washington, D.C., January–November 1997.

proponent schools) do not support weather requirements. Intelligence as the proponent has only the voice of Intelligence and weather is not the first or often even a considered priority in the Intelligence function area compared to key Intelligence functions. So when a requirements decision that requires the expenditure of resources is made (e.g., build IMETS or Automated Meteorological Sensor System [AMSS]), its value is viewed as a contribution to Intelligence functions (e.g., IPD, Reconnaissance allocations, unmanned airborne vehicle, flying mission, bomb damage assessment [BDA], SIGINT, HUMINT, counterintelligence [CI]) but not to other battlefield function areas (BFA) (e.g., soldier personnel protection, aviation flying weather, terrain analysis and flood forecasting, nuclear and chemical hazard protection, logistics support, Corps Support Command (COSCOM) equipment movement, artillery target area weather in deep fires). Consequently during warfighting lens analysis (WFLA) and other routine procedures to establish priorities, the weather functional area is defined only by Intelligence and in the mix of prioritizing does not have the weight of the other functional areas put behind it. In some cases, the need is clear and in other cases the requirements may go unknown. For example, Digital Topographic Support System (DTSS), Aviation Mission Planning System, Automated NBC Information System (ANBACIS), Surgeon General heat/cold warnings, and Armor's thermal cross-over for main battle tank's thermal sights are established users of weather. But new or emerging requirements and the potential value of using electro-optical decision aids is largely unknown for such purposes as (1) assisting targeteers in employing or synchronizing infrared, millimeter wave, and acoustically guided munitions; (2) forecasting cloud-free line of sight and lock on range for Apache HELLFIRE lasers or LONGBOW; (3) supporting COMANCHE stealth technology; and (4) forecasting winds and cloud bases in the target area for the Army Tactical Missile System (ATACMS), the Sense and Destroy Armor (SADARM), and Brilliant Antiarmor (BAT) submunitions. Therefore, weather programs are not supported by potential users in other functional areas.

Once TRADOC prioritizing procedures are complete they are sent to HQDA, DCSOPS, and DAMO-FDI for validation, final prioritizing, and resource management. The Program Managers for weather programs are normally under PM Intel Fusion but have not had a TRADOC System Manager (TSM) to help coordinate the programs on the TRADOC side. The Director for Combat Development is currently filling that role at USAIC&FH.

The DCSINT, DAMI-POB role is on the functional side and assists DCSOPS with functional evaluation and weather description in program management activities. However, beyond the TRADOC and DCSOPS roles, a significant amount of investment remains in basic research (AMC/Army Research Organization [ARO]), basic and applied research (AMC/ARL and COE/TEC/Cold Regions Research and

Engineering Laboratory [CRREL] /Waterway Experiment Station [WES]), and operational support to research, development, test and evaluation (RDTE) (AMC/TECOM) that run independently, and needs management attention. The HQDA, DCSINT, DAMI-POB is the only existing agency with capability to influence these areas, but it does not have clear lines of responsibility to affect management decisions in AMC and COE that may be counter to the development of a comprehensive weather support program from R&D stages to the warfighter.

DCSINT manages terrain, weather, and weather satellite areas according to AR 10-5. The small organization, two meteorologists (1 unfilled from 31 December 1996 to 1 November 1997) and one Air Force liaison, does not enable effective management. This is the basis for origination of the AR 5-5 study. Annually, during the first half of the 1990s the Army has reported in the OFCM Federal Met Plan about US \$20 million in operational costs (including TECOM) and US \$20 million in R&D costs (down to US \$13.2 million in FY 98). The perception at DAMI-PO was that DAMI-POB and the supporting management structure in TRADOC, AMC, and COE were independently drawn in different directions by independent forces and did not have a central management structure that could help coordinate the above expenditures. Consequently, DAMI-PO directed the AR 5-5 study initiative to be pursued in FY 96.

The Assistant Secretary of the Army for Research, Development, and Acquisition (ASARDA) manages the weather budget lines, but once they get to AMC/ARL/TECOM or COE and TEC/CRREL/WES they could be applied to nonweather programs. The Test and Evaluation Management Agency manages the TECOM Met Team funds but is focused on test range support and does not see clear value in the Met Teams at R&D facilities. The AMC/TECOM sees the need to determine critical weather effects threshold values (identified during testing) on new systems as an unfunded requirement directed by HQDA vice part of their mission.

Some guidance comes from the Office of the Deputy Director for Research and Engineering (DDR&E) during the Defense Technical Application Program (DTAP) and former Project Reliance agreements to direct Army weather research, as one of the three Services doing weather-related research. However, no funding authority or review board with a DCSINT role exists that controls or coordinates these activities to focus them on requirements in the ways that DCSOPS, DAMO-FDI does for the equipment programs in weather support.

4.4 ORGANIZATIONAL DESIGN THEORY

Organizational design, or really redesign, involves change—change in how an organization appears in a wiring diagram; change in where, how, and who in the organization performs its business; or change

in how and what the people in an organization think. However, as J. Berry⁶⁴ said "... the change must create value for the organization."

Dr. R. W. Keidel⁶⁵ states that organizational design has become a never-ending proliferation of metaphors and methods leaving everyone (managers, customers, and employees) confused by a welter of advice. The clutter can be divided into three basic categories: restructuring, reengineering, and rethinking. He contends that rethinking offers the best long-term prospects for clarifying complex organizations without trivializing them. Organization is conceptualized as a balance of hierarchical control, individual autonomy, and spontaneous cooperation. Understanding how Dr. Keidel's views on organizational design relate to the Army Weather Support Organization first requires a brief review of his article and an explanation of how the three basic categories he defines relate to the military environment.

Restructuring

Restructuring is the basic category of organization design and simply amounts to the manipulation of units represented on an organizational chart. This reconfiguration of organizational units, often large ones, usually involves the melding, combining, or disaggregating of portions of or whole functional units. Restructuring also almost always implies job loss and is often called rightsizing, downsizing, or may even be considered by some as "doing more with less."

In the case of the military, the federal budget dictates the size of many of the functions and organizations within the military. The budget and resources available to the military have been shrinking in the recent past, as summarized in Section 3, and will likely not increase in the foreseeable future. The AWSO has also experienced similar reductions in budget and personnel. The last spaces of the only truly definable AWSO—the TRADOC TWESO—disappeared in 1992. Therefore, solutions to the organizational problems, primarily decentralization and fragmentation of control and effort, that have plagued Army weather support almost since its inception will probably not be solved by restructuring, and the creation of a new organization is not even feasible due to fiscal constraints.

Reengineering

Reengineering on the other hand deals with the rearranging of processes—who does the work and where it is performed. Reengineering tends to be tactical, rather than strategic, because it focuses more

⁶⁴ J. Berry, 1994: Executive commentary, *Academy of Management Executive*, 8, (4), p. 43.

⁶⁵ R. W. Keidel, 1994: Rethinking organizational design, *Academy of Management Executive*, 8, (4), p. 12.

on the operational processes rather than the organizational purposes (problems), its timeframe is usually short term, and it may be shortsighted when considering the development of the people in the organization. When implementing reengineering its proponents advocate assuming that no organization currently exists, and by starting with a clean slate they will determine the best way to satisfy the customer's requirements.

Reengineering is often considered as the middle ground between restructuring and rethinking. It can be applied to the dysfunctional elements of an organization, left over from less competitive days with more resources available and where stovepipe and vertical thinking patterns abound. Reengineering can remove the bureaucracies and the defensive this-is-my-turf mentality, and turn these elements toward thinking in a more horizontal manner, more about the good of the organization than just of themselves. However, reengineering is usually a top-down-driven proposition and because of the mind set that "this exercise will work even if we have to break some legs," offers little incentive for employees to participate willingly.

In the civilian world a greater opportunity may exist for reengineering to work and overcome the narrow thinking of some organizational elements. However, the Army has had a horizontal organization structure and has used its doctrinal publications and other regulations to align and link the responsibilities (processes) of both individual organizations and types or classes of organizations. Therefore, wide sweeping changes to doctrine, redefining which organizations are responsible for which functions, would face an uphill battle, even if these changes were implemented. Another complicating factor when trying to reengineer the AWSO, is the joint nature of weather support to the Army. The existence of joint Army and Air Force publications makes the unilateral redistribution of responsibilities, or processes, much more difficult.

Rethinking

Dr. Keidel views organizational design as a mirror image of cognition and if the organization is to be redesigned effectively, the thought process must also be redesigned. "The target of 're-cognition' or rethinking is neither organizational units nor organizational processes. It is individual and collective mindsets, or ways of making sense of the world."⁶⁶ The success of re-cognition is only limited by the initiative, imagination, and ingenuity of the members of the organization.

⁶⁶ R. W. Keidel, 1994: Rethinking organizational design, *Academy of Management Executive*, 8, (4), p. 17.

Rethinking relates design decisions to thinking and acting in a systematic manner. One such model, as shown in Fig. 4-2, is triangular where organizations and their decisions can be understood as a balance of hierarchical control, individual or unit autonomy, and spontaneous cooperation.

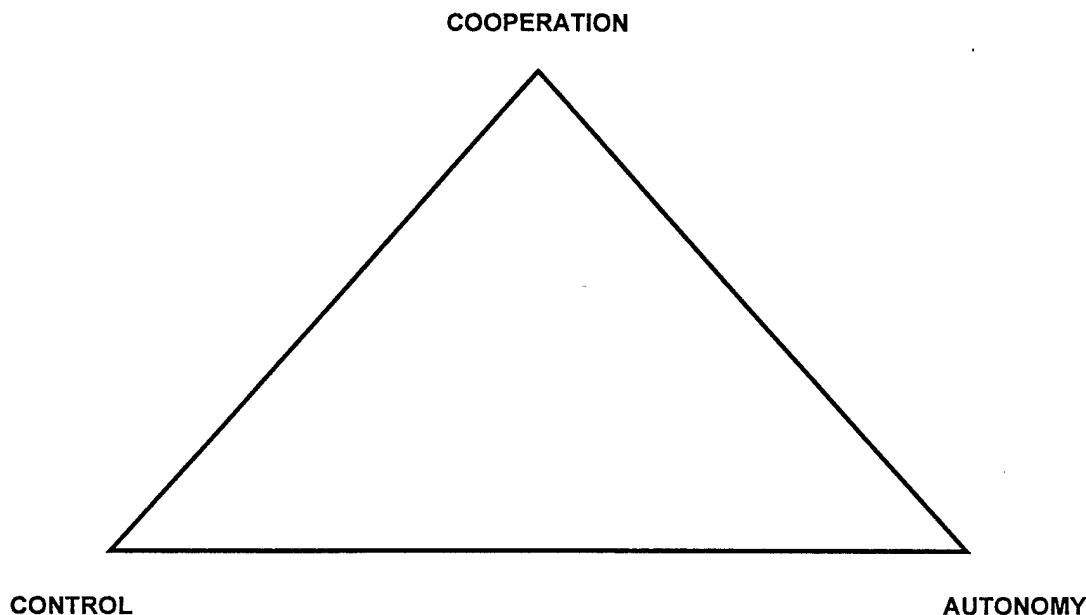


Figure 4-2. Organizational Design as Balance.⁶⁷

To use this model effectively the organization must very carefully “prioritize control, autonomy, and cooperation so that necessary tradeoffs are made; integrate these variables because all three are essential and interdependent; and focus on whichever variable(s) require attention at any given time, regardless of their priority.” Applying re-cognition to organizational design can have an overlapping threefold impact on the organization. “Cognitive change produces behavioral change, which then leads to performance improvement.” However, for this rethinking to be effective people must be given the opportunity to think freely and express their opinions. The members of the organization must have the opportunity to try out new or radical ideas or comment on here-to-fore “sacred cows.” This need for “free thinking space” could be satisfied by creation of a non-attribution, or “safe zone,” similar to an on-line “chat room.”

A cost is involved in rethinking—the frustration that accompanies the act of “thinking about thinking.” Criticism of established norms or patterns will produce discomfort and negative feelings. However, the positive returns promised from rethinking, which are at least commensurate with its cost,

⁶⁷ R. W. Keidel, 1994: Rethinking organizational design, *Academy of Management Executive*, 8, (4), p. 18.

include more sophisticated planning and an improved (more innovative) decision-making capability. In addition, as shown in Fig. 4-3, the potential leverage available from the use of the re-cognition approach is far greater than from the use of either restructuring or reengineering. This result comes from the application of a portion of systems theory called the “law of requisite variety: an organization must be able to match whatever variety (complexity) its environment presents. Or in sports terms, if your opponent can score in three different ways, you had better be able to defend against all three.”⁶⁸ Organizations that can respond effectively to these complex challenges will have a “cognitive edge” over those that cannot.

Analysis

Many of the issues facing the AWSO can only be solved through rethinking by the people within the organization. The outside constraints that impact the less favorable restructuring or reengineering categories take away most of the usually available options. Rethinking, however, overcomes many of these same fiscal and resource constraints, acknowledges the internal changes being made by the Army in Force XXI and within the AFW structure, and takes advantage of the intellectual capital, the core competencies, and the organizational learning of the AWSO to overcome historic management and organizational problems.

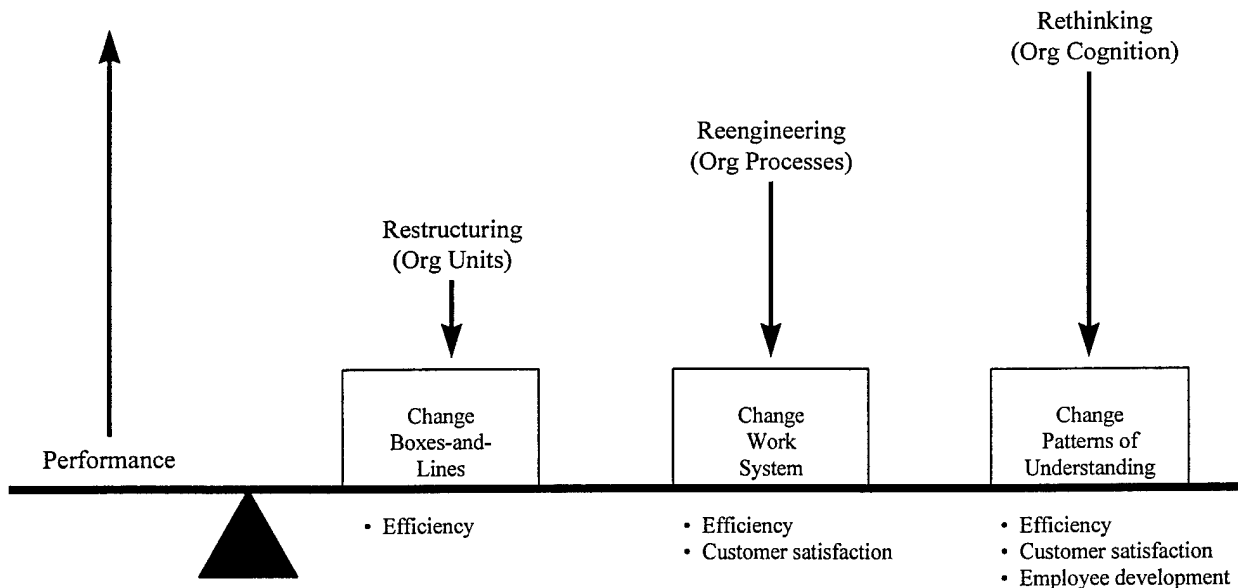


Figure 4-3. Alternative Leverage Points.⁶⁹

⁶⁸ R. W. Keidel, 1994: Rethinking organizational design, *Academy of Management Executive*, 8, (4), p. 15.

⁶⁹ R. W. Keidel, 1994: Rethinking organizational design, *Academy of Management Executive*, 8, (4), p. 21.

4.5 ARMY MANAGEMENT TOOLS

Historically the Army has always had a number of management tools available such as vertically organized or stovepipe entities, and special action groups or "tiger teams." While stovepipes, such as Signal, Intelligence, and Aviation, exist and are effective, weather support in the Army has not been organized in that fashion. Furthermore, the bulk of Army weather support is provided by Air Force weather units that were organized vertically. An effort to provide a vertical management structure within the Army was attempted in the early 1980s, but it was incomplete, ineffective, and eventually succumbed to cutbacks in the early 1990s. Now even Air Force weather units assigned to the Army are no longer organized vertically. Tiger teams by their very nature (deal with a specific issue, have a short lifespan by design, and are usually informal) are not applicable to the Army weather support problem set. Since these classical tools will not do the required job, other alternatives must be sought. The Army is providing these new tools.

The Army has changed its internal focus. It had been doctrine in the past to consider needs and requirements in terms of the perceived and identified "threat" and the problems or shortfalls in meeting that threat. Today and for the foreseeable future the Army identifies capabilities, both its own as well as anyone else's, in order to design, test, and implement systems to satisfy its needs. At the same time the essential sequential structure of development has been altered to compress the time cycle and take advantage of rapidly changing technologies and user experience. This latter change has been affected through the use of internal Army management tools known as ICTs, IPTs, and Battle Laboratories (BL). The result is an overarching entity that gathers the expertise of separate vertically organized and horizontally dispersed activities to act concurrently for a discreet period of time to reach established goals. TRADOC Pamphlet 71-9, Requirements Determination,⁷⁰ provides the details necessary for the effective implementation of a satisfactory ICT/IPT program. The idea of forming integrated teams of functional experts can be expanded beyond developing concepts and products to providing management itself. Indeed the commander's staff is itself an example of an integrated team formed to meet the established objective of leadership and management.

4.6 SUMMARY

The responsibilities of an AWSO are known by the various elements of the Organization. However, the synergism that comes from the intentional interaction and cooperation of these elements is not there.

⁷⁰ U.S. Army Training and Doctrine Command, 1997: *Requirements Determination*. TRADOC Pamphlet 71-9, 7 November 1997.

Simply put, the “soul” of the “body” is absent. But, the body has enough of the parts to be a viable organization if the life blood of cooperation, coordination, and rethinking (the soul of the body) can be infused into each element.

5. PROPOSED SOLUTIONS

The objective of this study has always been to recommend a management system that will learn from yesterdays mistakes, live within the limits of budget, management, and organizational constraints, and leverage the existing theories, tools, and enthusiasms of the people providing weather support to the Army. Problems other than a lack of a defined weather organization also exist. And these problems must be resolved. Some of these problems have been identified by the STC investigators, by others, and by members of the Army/Air Force weather community. Appendix E provides a list of some of these problems and offers some proposed action items, suggestions, or solutions. However, without an organization to implement these solutions effectively, the solutions will be temporary and the system will be condemned to experience the same problems over again without ever permanently solving any of them.

The joint nature of Army weather support makes any AWSO a unique organization and may in fact provide part of the basis for the solution. The Services have an opportunity to move away from historic Service rivalries and inequities, and rethink their individual missions, namely, giving to the Army the type of weather support that will assure that the Army exploits the weather and knowledge of the weather to the fullest extent possible. The weather culture of the Army customer and the cultural approach to the role of the Army and Air Force weather support providers can and must be changed.

In the first subsection two assumptions are discussed that are used in preparing potential solutions. Next, the nine characteristics are presented that were used when developing each of the solutions found in Subsection 5.3. Four potential solutions are also presented in Subsection 5.3.

5.1 SOLUTION ASSUMPTIONS

In reviewing and evaluating several different options only two assumptions were made. First, the Army has embarked on an evolutionary process that is reshaping how it thinks, organizes, establishes requirements, acquires materiel, and fights. And second, that like the Army, current management theory and practice is also changing.

Military organizations have in the past, like corporations, been organized vertically by functions such as manufacturing, marketing, finance, infantry, armor, intelligence, weather, and supply. "As a consequence, employees' mindsets have become defined by their particular function, or 'silo' or 'chimney,' or stovepipe as some have put it."⁷¹ The stovepipe thinking becomes "What's good for MI is good for

⁷¹ R. W. Keidel, 1994: Rethinking organizational design. *Academy of Management Executive*, 8, (4), p. 15.

the Army;” “What’s good for the Artillery is good for the Army;” or “What’s good for Air Force Weather is good for Army Weather.” Now, the Army has embarked on a new way of thinking. The Army perceives change not only in terms of increased operations around the globe and restructuring but also in the manner in which it conducts combat operations. The Army is now identifying requirements in terms of acquiring new “capabilities,” not correcting old “problems.” The Army has designed Force XXI to harness these changes: more lethal, survivable, and agile systems; more capable soldiers and leaders; increased integration of service components into an effective battle team; and increased information dominance. The recognition of the importance of information dominance and its successful implementation into the Army is fundamental to the success of the other envisioned changes and to the basic operational patterns of the Army. Weather Intelligence is a key part of the information package. The AWSO must be ready to provide the Army the Weather Intelligence and information dominance it needs.

The recent turmoil in business and military organizations tends to substantiate the current management theses discussed in Subsection 4.4. When designing or redesigning organizations small changes or radical overhauls do not work; a reasoned balance of control, autonomy, and cooperation must be achieved in an organization as the basis for success, and employees must be involved in organizational change. In addition, the current state of the AWSO may be best described by the following quote from Keidel’s article: “The work systems of many corporations [*organizations*] are dysfunctional remnants of a less complicated, less dynamic, less competitive day and age. Moreover, all organizations tend to bureaucratize over time—as routines become entrenched, turf becomes delineated and defended, and politics takes precedence over performance. In short, the interests of the organizational parts assert themselves over the interests of the whole.”⁷² Therefore, rethinking, not necessarily redesigning the AWSO, is warranted.

5.2 SOLUTION CHARACTERISTICS

To evaluate several alternative solutions, the following list of characteristics was developed and used to measure the effectiveness and potential for success of various solutions: This list was prepared from several guidelines referenced in this report along with other common sense approaches.

⁷² R. W. Keidel, 1994: Rethinking organizational design. *Academy of Management Executive*, 8, (4), p. 16.

1. Create a need for weather support.

The primary objective of the AWSO should be to develop a weather culture in the Army that demands weather support from an enthusiastic Air Force weather provider and uses knowledge of weather and weather effects in every facet of its mission.

2. Recognize and satisfy the law of requisite variety.

Systems theory defines the law of requisite variety such that “an organization must be able to match whatever variety (complexity) its environment confronts it with. Or in sports terms, if your opponent can score in three different ways, you had better be able to defend against all three.”⁷³ Since enemies of the U.S. Armed Forces in the past have used weather to their advantage the U.S. military must, at a minimum, consider how weather effects might be used by its enemies, as well as its own forces, in future military operations.

3. Follow successful initiatives.

Take advantage of the Army’s current efforts to rethink its own organization. The Army’s vision and concept statements of the future, the use of BLs to test ideas, and the formation and use of ICTs to work issues are all Army initiatives that lend themselves to the weather management challenge.

4. Develop the organizational triangle of Control, Autonomy, and Cooperation.⁷⁴

Control within the AWSO needs to be established; no one is clearly in charge. *Autonomy* (or lanes) already exists but needs to be harnessed and redirected to achieve greater synergism. *Cooperation* needs to be more strongly encouraged; lanes should not have concrete dividers.

5. Mirror the larger organization.

Today’s Army is more horizontal than vertical. Stovepipe weather failed before and would fail again for the same reasons—current budget and manpower constraints and the lack of an Army weather culture. Use the same logic in reorganizing weather management as that which connects cognitive patterns (thinking) and organizational patterns in today’s Army.

6. Strive for reciprocal interdependence; bring resources together simultaneously.

Use accepted and available Army programs (e.g., ICTs/IPTs, and BLs) to bring separate agencies together in a concerted effort to reach a common goal.

⁷³ R. W. Keidel, 1994: Rethinking organizational design. *Academy of Management Executive*, 8 (4), p. 20.

⁷⁴ R. W. Keidel, 1994: Rethinking organizational design. *Academy of Management Executive*, 8 (4), p. 18.

7. Plan changes that do not threaten core beliefs but build on values.

It is an essential Army belief that it will prevail over any obstacle, manmade or natural, by force of will, improvisation, or adaptation. Build on the idea that the Army is resourceful, innovative, and imaginative, and educate its agencies on how weather and weather effects can help them to prevail.

8. Give organizational members a forum to change themselves.

Do not assault, infiltrate; do not direct, educate; do not isolate, cooperate.

9. Involve each member of the organization in some way in the changes being considered.

People need to feel in control and feel convinced about the need for and value of the change. At a minimum personnel should be informed why the change is being implemented.

5.3 POTENTIAL SOLUTIONS

The primary objective was to “identify an adequate management organization and charter to manage Army weather programs and support functions.” Three primary factors have been identified as being key considerations in the development of potential solutions. First, the history and current fragmentation of the organizations providing weather support to the Army between two Services and their several MAJCOMs and MACOMs create an atmosphere for the development of a culture in the Army that does not highly value weather and a culture in AFW that does not value the provision of weather support to the Army. Outside influences, such as a decreasing budget for the DOD and an Army that is continually setting more sophisticated goals for its soldiers and its exploitation of technology, are limiting available resources while expanding the requirements of any AWSO. And finally, changes in the application of current management theories and the availability of new Army management tools make rethinking of organizations and their purpose a possibility.

In considering possible solutions the STC investigators ranged far and wide but tried to maintain some degree of reasonableness. Solutions such as “only fight on dry, calm, warm, and sunny days” were easily discarded. The four major remaining solutions are briefly summarized in the following paragraphs.

Option 1. Establish a Formal Army Weather Support Organization

Key Points

A formal AWSO is the legal recognition and clarification of the responsibilities of the joint Service organizations providing weather support to the Army. The establishment of a formal AWSO improves the management of Army weather support under the existing Intelligence proponentcy.

The AWSO satisfies the objective of identifying an organization and charter that will tie together the varied and diverse joint Service assets responsible for Army weather support. It recognizes the limitation of resources that can be devoted to such an organization to foster immediately the cooperation necessary to achieve success in a resource-limited environment and to provide the control needed to avoid duplication of effort and achieve unity of purpose.

The AWSO provides the immediate inter-Service forum for the RDT&E, doctrine, operations, training, AFW, and proponent organizations to identify and satisfy the warfighters' weather requirements most effectively and efficiently.

Use of the existing TRADOC DTOLMS requirements process will combine the autonomy of the various responsible organizations with the cooperation fostered by the ICT/IPT process to address the specific short-term problem areas that need immediate resolution.

Comments

To have both legal authority over both Services in the AWSO and to provide a reasonable degree of certainty that the AWSO will survive, the AWSO must be based on law. The National Security Act of 1947 provides the legal basis for the provision of joint Service weather support to the Army. AR 115-10/AFJI 15-157, Weather Support for the U.S. Army, is the implementing instrument for that act. Therefore, the responsibilities of the AWSO and its member organizations must be detailed in this joint publication. However, even minor, noncontroversial changes to that regulation have taken years to gain approval and implementation. Therefore, to ensure that Army weather support does not continue to founder as the fragmented and "dysfunctional remnants of a less complicated, less dynamic, less competitive day and age," activation of the AWSO will be established in two steps.

First, the AWSO will be implemented by the establishment, for a specified period, of a senior leaders committee (SLC), containing the senior officers of the primary organizations providing weather support

to the Army. The SLC will provide immediate leadership to the joint Service assets of the AWSO. In this role the SLC's primary mission will be to prepare and staff changes to AR 115-10/AFJI 15-157 that will clarify and make permanent the mission and responsibilities of the members of the AWSO.

Second, the AWSO, through the SLC, will identify the major problem areas of today's Army weather support and use ICTs/IPTs or other existing Army management tools to implement necessary actions. The SLC will provide priority for the addressing of problems, foster cooperation among all AWSO organizations, and give the immediate control and direction that will assure that actions started by various ICTs/IPTs are completed and satisfy their intended purpose.

Option 2. Give All Responsibility to the Air Force

Key Points

Give all management and operational support responsibilities to the Air Force, including equipment, personnel, and RDTE. The Air Force would be totally responsible for planning, executing, and providing all facets of weather support to the Army. Included among the changes that would be required are:

- (1) Shift TOE equipment for WETMs to the Air Force to manage like ALO equipment.
- (2) Stop Army development of IMETS and shift all funds to complete fielding it in the 2000-2010 timeframe.
- (3) Drop all internal Army management functions and have the Air Force provide for Army specific responsibilities during routine business.
- (4) Rescind AR 115-10.
- (5) Shift ARL, TECOM, and COE weather research personnel and budget lines from ASA(RDA) and TEMA to the Air Force to manage.
- (6) Shift all OFCM aviation panels and other joint or international meteorological panels to Air Force management.
- (7) Give Joint Chiefs of Staff, Army Global Command and Control System (AGCCS) weather design responsibilities to the Air Force.

- (8) Request Air Force liaison officers be assigned to all key locations where input to the Air Force is needed.

Comments

The lack of a real Army weather culture would be exacerbated. There would be a high risk that the effects of benign neglect would be devastating. There would be a virtual total loss of Army control. To quote Brig. Gen. B. Rowe, former Air Weather Service Commander, "They (*the Army*) left it kind of to the staff weather officer, and frankly, the staff weather officer came to the Army with Air Force solutions to Army problems. And I don't think that's a viable approach to the problem at all."⁷⁵

Under this option the Army would need a guarantee that the Air Force will change the focus of its traditional airfield support and work to integrate fully Army weather into the AFW mission and responsibilities. Air Force personnel, as required, would be everywhere and do everything related to weather in support of the Army. Air Force personnel supporting the Army will require special training, for example, CAS3 and CGSC, and special experience identifiers documenting their Army weather experience.

Option 3. Establish an Army Weather Service at the Aviation Center

Key Points

Move proponentcy to the Aviation Center, and shift all management and operational responsibilities from the Air Force to Army Aviation.

The National Security Act of 1947 would have to be changed, amended, or somehow modified so that the Army would be totally responsible for planning, executing, and providing all facets of weather support to itself. This proposal would also involve transferring all current Air Force manpower authorizations and the associated funding to the Army. It would include such authorizations as SWO billets at DAMI-POB, TRADOC, USAIC&FH; and all Air Force billets providing direct operational support to the Army.

Comments

⁷⁵ Interview by J. Fuller, Air Weather Service Historian with Brig. Gen. B. Rowe, Commander Air Weather Service, recorded 26 June 1978.

Establishment of an Army Weather Service at the Aviation Center may be the intuitive solution. It puts weather in Operations like all other Services and the Joint Chiefs of Staff. The option of shifting weather from G2 to G3 oversight puts weather support under a branch that cannot operate without it. It would require that Army weather personnel be trained at Air Force schools or join with the Marines in developing a special ground track for Army/Marine students. This shift solves the problems of having no Army weather experience. It requires that all AFW equipment be transferred to the Army at Army airfields and tactical weather equipment to the CWTs. Furthermore, manpower authorizations for the Air Force WETMs supporting the Army would be transferred to Army Aviation. Warrant Officer positions would also be created as master weather forecasters. Army weather companies, under Aviation Brigades, would be established requiring the request of a waiver to the NSA of 1947. Support agreements with the Air Force would be established for output from the AFGWC and forecasting hubs. In addition, a large administrative and command overhead would be associated with these new Army responsibilities.

Option 4. Do Nothing, Leave Everything as Is

Key Points

The first question the STC investigators were asked at the start of a particular visit was, "What is the problem?" It was apparent that if there was no problem to define then the only solution was "Do nothing."

Comments

During this study the STC investigators discovered that weather support doctrine was three generations out of date; the MI community was not teaching weather awareness to its own officers and soldiers, let alone the rest of the Army; except for Aviation and Artillery, the Army made little use of weather information; Army leadership, without a current concept of weather operations, seemed oblivious to weather as a force multiplier; materiel developers made little effort to consider critical weather values in development; and weather support provided by the Air Force at times stressed Air Force solutions to Army requirements and lacked a base of interested, experienced personnel to support the Army. Hardly a case for "Do nothing."

6. RECOMMENDATION

The solution to this task is simple and straightforward. It requires little in the way of fiscal resources and no new, elaborate organization. There are two major ingredients to the solution. First, the Army must take weather seriously. The IPB triad of enemy, weather, and terrain must be a *real* triad and not an out-of-balance two-legged stool. The provision of weather intelligence to non-Artillery Army customers must be accepted as an Army Military Intelligence responsibility. Second, the Air Force must take the Army's weather requirements seriously. It must devote resources of comparable quantity and quality to both Army and Air Force weather customers. In other words, the weather cultures of both Services must change.

To make this cultural change a reality, the implementation of Option 1, the establishment of a formal AWSO, is recommended. Use of an immediate, short-term SLC will provide a strong foundation for the development of a better Army/Air Force weather culture. It will also provide the structure for the formalization, through AR 115-10/AFJI 15-157, of a lasting joint Service relationship that leverages both Air Force and Army resources more effectively to produce long-term, permanent results. Through the use of the TRADOC ICT/IPT⁷⁶ process immediate actions can be initiated and completed that will lead to the institutionalization of solutions to such major weather support problems as the out-of-date weather support doctrine and lack of weather training for Army MI officers.

6.1 CHARACTERISTICS OF THE ARMY WEATHER SUPPORT ORGANIZATION

The basic characteristics of the SLC and specific weather-oriented ICTs are presented in the following subparagraphs.

1. Senior Leaders Committee

Charter—At least two options are available for the provision of both legality (power and control) and continuity to this group. One is the establishment of an SLC that could receive its charter from the Chief of Staff of the Army. The other is to establish a formal, tier one ICT chartered by the CG TRADOC under TRADOC Pamphlet 71-9.⁷⁷ Other options or names for this group may exist but must not interfere with or detract from its main objective, the provision of an immediate management organization for the AWSO with sufficient continuity for that

⁷⁶ TRADOC Pamphlet 71-9, Requirements Determination, 7 November 1997.

⁷⁷ TRADOC Pamphlet 71-9, Requirements Determination, 7 November 1997.

management structure, at least 18 months, to have the AWSO formally established in AR 115-10/AFJI 15-157.

Purpose—The SLC will be designed to fulfill the following major functions:

1. Create an immediate, continuing, overarching management structure to provide, as appropriate, such items as vision, guidance, values, policy, priority, and strategy for elements of the AWSO.
2. Prepare and implement changes to AR 115-10/AFJI 15-157, which institutionalizes the responsibilities of the members of the AWSO and the results they achieve.
3. Motivate action within the military structure toward a real weather culture through support of a proactive weather marketing campaign.
4. Assure sufficient funding for both the Army and Air Force weather support budgets.
5. Resolve differences, both internal Army and cross-Services, for limited resources.
6. Assign responsibilities for action and require accountability.

Composition—The SLC will be composed of six primary voting members and their designated alternates. The FORSCOM member will represent all operational MACOMs (e.g., USAREUR) on a routine basis. These commands may choose to attend an SLC meeting and will be considered full, voting members whenever they attend. The Chair Person will be the HQDA DCSINT. A nonvoting member will be identified as responsible for the administration of the actions of the SLC including ensuring that directions of the SLC are implemented, overseeing the actions of the ICTs/IPTs established by the SLC, and scheduling and arranging for all meetings.

Primary Member	Alternate Member
HQDA DCSINT	DAMI-POB
FORSCOM DCSINT	FORSCOM SWO
CG USAIC&FH	USAIC&FH DCD
CG USAFAS	USAFAS DCD
ARL	ARL-W
USAF/XOW	USAF/DXOW
Secretary	

Operation—A single face-to-face meeting and two video teleconferences will be held during the months of October, February, and June and attended by the primary members. During the remaining months the alternate members may meet, also via a video teleconference as required. The SLC secretary will distribute minutes of all meetings to all primary members and their alternates as well as individually to all attendees.

Other Items—Formation of an SLC can also be used to address the issue raised in paragraph 3.a.(4) of the SOW (. . . management process within current acquisition procedure . . .) in the following manner. Individual requirements will be submitted by each TRADOC center or school using the approved TRADOC requirements process. The Director of Combat Developments and/or the SWO will also submit a copy of the requirement to the SLC and the TRADOC SWO. The SLC will collect similar weather support requirements, review them for competing or complementary objectives, evaluate and consolidate them, and forward the composite requirement to TRADOC as an Army-wide requirement. The TRADOC SWO, or a TRADOC System Manager (TSM), if one has been appointed, will act as the point of contact for future staff actions regarding the requirement.

An example of how the SLC will be able to address paragraph 3.a.(5) of the SOW (. . . support to a “hi tech” Army force . . .) is illustrated as follows. The Air Force is currently reengineering its weather support procedures and organizations. Among the proposals is the objective to fill all of the authorizations for the CWT supporting Army tactical units. The SLC will be able to plan, organize, coordinate, communicate, and control some of the weather training conducted by the CWT to maximize its effectiveness. Through the use of existing and future automated weather support systems (e.g., IMETS II), the CWTs can prepare, during their local in-house training, climatological weather effects databases that can be used by Army commanders to execute short notice contingency operations as envisioned for the Army of the 21st century.

2. Specific Weather Issue ICT/IPTs

Charter—Each ICT will be formally chartered as necessary following procedures in TRADOC Pamphlet 71-9 for either a tier one or tier two ICT. Other facets of the requirements determination process as directed in TRADOC Pamphlet 71-9 will be implemented to satisfy specific issues.

Purpose—To complete specific actions identified by the SLC and to report to the committee as scheduled. Appendix E provides a list of potential issues that may be addressed, singly or in combination, by an ICT.

Composition—The members of each ICT/IPT will be determined by the issue to be addressed and will be assigned by the SLC. The secretary to the SLC will provide overall (as required) guidance and direction to each ICT/IPT. The list furnished below identifies the primary pool of potential members of an ICT/IPT. However, this list may be augmented as necessary for specific issues. The FORSCOM member may represent all operational MACOMs (e.g., USAREUR) on a routine basis.

USAIC&FH-WST	USAIC&FH-DCD
DAMI/POB	ARL-W
AFCWC	TEC
TRADOC	CAC
FORSCOM	ARSPACE
Field Artillery School	SARDA
DAMO/FD	IMETS PM
COE	Engineer School
Infantry School	Aviation School
Armor School	Corps SWOs
TECOM Met Teams	

Operation—Each ICT/IPT will adhere to the schedule established by the SLC for each specific issue and will meet so as to accomplish its objectives within the prescribed time. Conduct and operation of each ICT/IPT will be under the direct guidance and supervision of the president of each team who shall report progress to the SLC.

An Army weather support web site shall be established and serve as a forum for daily discussion of weather support issues and be accessible by all AWSO personnel as well as user agencies.

6.2 IMPLEMENTATION OF THE ARMY WEATHER SUPPORT ORGANIZATION

Two major activities must occur for this proposal to succeed. First, the joint regulation on Army weather support must be changed to include the formal recognition of the AWSO infrastructure, the definition of the responsibilities of its various members, and the assignment of control. Second, a coordinated, integrated series of ICTs should begin action on the major problem areas.

To make these activities possible, it is recommended that the members of the SLC identify sufficient resources to form a special group to accomplish these two goals and serve as the secretary to the SLC identified in previous paragraphs. This group will perform such activities as research, staff coordination, and monitoring of actions that may be necessary. Authorizations for this group may come from overmanning an existing manpower space (e.g., assigning two personnel to the AFW liaison officer position assigned to DAMI-POB); using some of the unfilled weather spaces in ARL-A; using contractor personnel jointly funded by all members of the SLC; or other more creative measures. The objective is to identify a special group of two or three personnel whose primary responsibility will be to "staff" actions for the SLC. The group, like the SLC, will cease to function after the necessary changes to the joint regulation are made.

6.3 SUMMARY

The goals of developing a better weather culture in the Army and a positive approach toward Army weather support in AFW may not be achieved immediately. However, the establishment of a formal AWSO, through the creation of a short-term SLC, will provide the control necessary for the successful completion of a series of coherent steps, using the TRADOC ICT process, necessary to achieve those goals. Without these steps weather intelligence will remain the forgotten, broken leg of the IPB triad. And George Santayana's quote, "Those who cannot remember the past are condemned to repeat it."⁷⁸ will become the damning epitaph of Army weather support.

⁷⁸ G. Santayana, *Life of Reason*, 1906.

APPENDIX A. ORIGINAL STATEMENT OF WORK

8 November 1996

**STATEMENT OF WORK
Modernized Army Weather Support and Organization**

1. OBJECTIVE. Evaluate and recommend architectures in two areas:

- a. Required management structure linking interacting major Army commands (MACOM), agency staffs, and research and development (R&D) agencies.
- b. Best method to develop and employ technical capability to display weather information to the warfighter.

2. BACKGROUND.

a. Mission. The recommended management structure upon implementation will manage over \$40 million per year in Army operational support funding and in research and development (R&D) and deliver critical weather effects information to the warfighter. HQDA ODCSINT reported in the FY97 Federal Plan for Meteorological Services and Supporting Research for the use of Congress and the Executive Branch the Army would spend \$23.7M for operational support and \$19.6M in R&D.

(1) There is no single management structure overseeing the operational expenditure or directly linking warfighter weather requirements to weather R&D programs. All programs are well intended in their own right, but not focused on high payoff areas responsive to warfighter needs. Better management can combine parallel acquisitions and research to save resources and develop what the warfighter needs in this key, but often overlooked, part of combat intelligence. Better weather management structure could enable information from TECOM Meteorological (Met) teams testing activities to identify weather effects critical threshold values and apply them to tactical decision aids for warfighters.

(2) Automated weather tactical decision aids can provide valuable information to enable commanders to use smart munitions more effectively in adverse weather conditions. For example, during DESERT STORM in Battle of 73 Easting, the exchange ratio during low visibility, using bad weather tactics, was 144 Iraqi losses to 2 U.S. Army losses. This kind of result can be preplanned by knowing our own limitations, comparing them to threat limitations in adverse weather, and selecting the most effective mix of smart weapons systems and sensors. This approach can be maximized in Information Operations. A "hi-tech" approach to digital weather presentations, overlaid on the common relevant picture, visualization of weather in mission planning systems, and interchange of seamless current and forecast weather are key parts of Information Operations that need to be developed.

(3) To achieve these objectives, improved management of Army R&D must focus Army capabilities on developing and acquiring the assets to observe and forecast weather in field conditions on a higher level of resolution and to identify limitations on friendly and threat systems with the clear objective to exploit differences in limitations through Information Operations. Training Army soldiers on the importance of weather integration into operations is needed in core officer and NCO curricula, and in MI and combat arms OBC/OACs.

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Prior Efforts. None that can be determined.

3. TASKS - Describe what is to be done.

a. Identify and adequate management organization and charter needed to manage Army weather programs and support functions.

(1) Identify key positions in HQDA. ODCSINT/DAMI-POB and ODCSOPS/DAMO-FDI, identify key positions in HQDA, ASA(RDA); TRADOC Headquarters, Centers, and Schools; Army Materiel Command and its major subordinate commands; U.S. Army Medical Research Command; U.S. Corps of Engineers; warfighting major commands needed to successfully manage the Army weather functional area.

(2) Identify deficiencies where key positions are needed but not filled.

(3) Describe process and organization to manage resources (acquisition programs, operational personnel, equipment, and supporting R&D).

(4) Describe a management process within current acquisition procedures to combine several low priority weather support requirements from several individual battlefield operating systems or functional areas within TRADOC to effectively build a consolidated support base to get funding for the capabilities the warfighter needs.

(5) Outline a plan and methodology to specify how the organization, recommended above, should be used to build the weather support capabilities Army component commanders need to support a "hi tech" Army force using digital C41 equipment to execute Information Operations.

(6) Recommend a procedure to ensure critical weather effect threshold values are collected during testing, archived, and made available to weather effects Tactical Decision Aid developers and program managers to build to support warfighting missions.

b. Army warfighters need a coherent architecture and plan to develop the capability to provide weather information to them in an easily used and understandable format. This includes tactical decision aids showing impacts on operations overlaid on situation maps and the battlefield visualization of changing forecast weather conditions in mission planning systems, simulations, and in displays of weather satellite cloud movement.

(1) Describe high payoff mission areas where better weather information and battlefield visualization could improve Army tactical planning and execution.

(2) Describe key schools or training programs needed to formally teach advantages of integrating weather in routine planning procedures and build awareness of the potential adverse effects and process to use weather to the Friendly Force advantage.

(3) Recommend key organizations and outline procedures to integrate weather into developing Information Operations and Battlefield Visualization.

(4) Recommend warfighting functions where better weather effects information should be used, i.e., targeting cells, automated intelligence preparation of the battlefield, rescue and night vision operations, aviation mission planning system, unmanned aerial vehicles, and advanced artillery deep operations, etc.

c. Review commercial and private sector technologies to determine current availability of hardware and software for Army Research and Development to leverage to help meet the weather intelligence requirements of Army warfighters.

4. DELIVERABLES.

a. Interim report and final bound document. Reference Basic 'K' Contract DD 1423 and the Scientific and Technical Reports data Item A002. The quantify is to be determined. The interim report and final bound document are due six months and one year, from start of study, respectively. Deliver to:

HQDA (DAMI-PPM, Mr. Nolan), Room 2E477
1022 Army Pentagon, Washington, D.C. 20310-1022.

5. CONTROL PROCEDURES.

a. Reviews will be held quarterly (every three [3] months), with an in-progress review (IPR) to be held six months from start of work.

b. Monthly status reports will be submitted; reference Basic 'K' Contract DD 1423 and the Scientific and Technical Reports Data Item A002.

c. Financial expenditures will be submitted monthly; reference Basic 'K' Contract DD 1423 and the Performance and Cost Report Data Item A003.

6. GOVERNMENT FURNISHED SUPPORT. To be determined.

APPENDIX B. FIRST MODIFICATION TO STATEMENT OF WORK

18 June, 1997

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Contract #DACA76-93-D-0005
Delivery Order #0005

ADDENDUM TO STATEMENT OF WORK
Modernized Army Weather Support and Organization

1. Change the following:

a. Eliminate existing objective 1.b., Task 3.b., 3.b.(1) through (4), and 3.c. in the current Statement of Work (SOW) and insert new paragraph 1.b. and 3.b. as follows:

1.b. Provide enhancements to existing weather support by focusing on immediate payoffs for tactical ground warfighters.

3.b. Conclude activities on SOW study objective 1.a. (management structure) as described in paragraph (TASKS) 3.a. (1) - (6). Refocus the remainder of the study to the new tasks stated below. This shifts the focus to immediate payoffs for warfighters.

(1) Review the existing rules for the Integrated Weather Effects Decision Aids (IWEDA), Block II. Confirm the validity of the existing rules and weather effects critical values and recommend changes to rules or critical values, as appropriate.

(a) Meet with or hold telephone/video conferences with USAIC&FH DCD Weather Section to assist the current state of work in progress. Obtain further guidance from the Weather Section to identify systems and areas of primary importance where contractor should assist.

(b) Based on guidance from USAIC&FH DCD Weather Section, assist in updating existing IWEDA rules and critical values. Systems and operation used most often to support Major Army Command (MACOM) warfighters will take precedence. The objective is to review IWEDA rules and critical values to ensure MACOM corps/division/ACR/Aviation Brigade warfighters have accurate, reliable, and usable information presented to them when they view the IWEDA displays and map overlays. This includes validating the rules shown when components and subsystems are interrogated to determine why an area is colored red or yellow for a system or operations.

(c) Visit user communities as required, to access existing Army or Air Force Weather effects databases to ensure current 1997 Army equipment and operational concepts are the basis for existing rules in IWEDA, IMETS Block II.

(d) Use the USAIC&FH DCD facilities and equipment, including IMETS block II workstations resident at USAIC&FH, to review, modify, or update IWEDA databases and master data files/software.

(e) Update USAIC&FH DCD Weather Section routinely throughout the process to facilitate expeditious application of contractor work in the larger project to update and enlarge future issues of IWEDA software.

(f) In the final bound document for this study:

1 List existing IMETS Block II, Integrated Weather Effects Decision Aids (IWEDA) rules for each operation or weapon system. In the list, compare the existing critical values for each rule with the new critical values that have been determined. Document and date the new critical values with source information such as technical manuals, interviews with users, interviews with OPRs (e.g., National Ground Intelligence Center action officers, III Corps units, Test and Evaluation Command (TECOM) Meteorological Teams, etc.). For each sub-system within the major weapon system or operation, list the sub-system, existing critical value, new critical value, and documentation of source of change information. Coordinate documentation procedures with the USAIC&FH DCD Weather section to facilitate direct use of results in the weather effects Critical Values Database.

2 List all software changes made for the USAIC&FH DCD Weather Section in IMETS IWEDA software. List will summarize changes made in software.

(2) Upon completion of IWEDA work above continue to work with USAIC&FH DCD Weather section to build/develop a master list of standard templates/formats/graphic displays (referenced as templates hereafter) for weather information by Battlefield Functional areas (BFA) or Battlefield Operating Systems (BOS) to be hosted in the Block II IMETS software. Software may be on either IMETS workstation, as appropriate.

(a) First priority are the Aviation BOS templates. Leverage existing USAIC&FH DCD Weather Section Work to develop a final set of aviation templates.

(b) Next priority for development of templates is Terrain Analysis in Intelligence Preparation of the Battlefield (IPB). USAIC&FH is automating IPB weather analysis to encompass a series of standard graphic products and data fields of weather information. Develop the set of templates needed for planning (based on climatology), and for execution (based on current and forecast weather conditions). Develop a standard set of graphics that meet requirements of Terrain Analysis, tailored for direct, immediate use by current and future terrain systems (i.e., DTSS, CTIS). Templates will be hosted on IMETS Block II and later systems. Templates will become the default set of IPB weather tools to prepare weather analysis products, tailored and ready for direct application into CTIS for further processing in IPB Terrain Analysis.

(c) Evaluate and list electro-optical TDA needed by current or emerging weapons systems.

(d) In the final bound document for this study:

1 Develop/provide a master list of new or modified templates/graphic displays created in the effort.

2 List individual charts, templates, and displays developed.

3 Develop/provide a list of, recommending for future development, all TDA not yet developed but recognized as needed based on experience in working with users in this effort. For example, this list may include electro-optical tactical decision aids (EOTDA) for an existing system (e.g., Apache Target Acquisition and Designation System/Pilot Night Vision System [TADS/PNVS]) or for new emerging systems (e.g., Comanche stealth technology).

4 Develop/provide a checklist of procedures to develop and validate the user of an IWEDA tactical decision aid.

(e) Provide USAIC&FH DCD and PD IMETS hard copies of each new template and provide software copies of the templates on disk or other media required by USAIC&FH DCD Weather Section, with information copy to DAMI-POB.

APPENDIX C. STC LETTER REQUESTING EXTENSION



SCIENCE and TECHNOLOGY CORP.

101 Research Drive, Hampton, Virginia 23666-1340 USA

Telephone: (757) 865-1894 Fax: (757) 865-1294

Home Page: <http://www.stcnet.com>

**REPLY TO ATTN OF: STC CONTRACTS DEPT
CONTRACTS@STCNET.COM**

6293-005

28 August 1997

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US Army Topographic Engineering Center
Contracts Office, CETEC-CT, Ms. May M. Lew
7701 Telegraph Road
Alexandria, Virginia 22315-3864

Reference: Contract No. DACA76-93-D-0005, Delivery Order No. 0005

Subject: Request for Completion Date Extension

Dear Ms. Lew:

Science and Technology Corporation (STC) requests that the completion date of the referenced delivery order be extended through 31 March 1998, at no additional cost to the Government.

This extension is requested to allow additional time to complete the delivery order requirements as a result of two additional subtasks to the Statement of Work (SOW) authorized by Modification No. 000502: Paragraph 3.b.(1), which requires validation of IWEDA rules (IWEDA subtask); and Paragraph 3.b.(2), which requires the development of a list of templates/graphic displays (template subtask).

Based on a new completion date of 31 March 1998, STC proposes the following revised delivery schedule:

- Technical effort on the original SOW tasks and on the IWEDA subtask will be completed with all deliverables submitted by 12 December 1997 (the original due date).
- Technical effort on the template subtask will be completed with all deliverables submitted by 31 March 1998.

6293-004

Ms. May Lew, TEC

28 August 1997

Page 2

The revised delivery schedule and completion date extension, as proposed, has been coordinated with the following Government technical representatives: Ms. Joni Jarrett, COTR; Mr. Steve Nolan, Technical Monitor, DAMI-IFM; and Mr. Lee Page, Technical Monitor, DAMI-POB. Coordination and concurrence was obtained on this date per telecon between Mr. Steve Nolan and Mr. Carl Chesley of STC.

Your consideration of our request is appreciated. If you have any questions of a technical nature, please contact Mr. Chesley at our Hampton Technical Office, (757) 865-0467; please direct all other questions to Ms. Carla A. Coombs, Sr. Contract Administrator, at our Hampton Corporate Office (757) 865-1894.

Sincerely,



Edward G. Bimler

Vice President - Contracts

CAC/

cc: Mr. Steve Nolan, DAMI-IFM
Mr. Lee Page, DAMI-POB
Ms. Joni Jarrett, USATEC COTR

APPENDIX D. PERSONNEL CONTACTED

Personnel Contacted

Name	Organization and/or Office Symbol
Lee Page	Chief, DA Weather Team DAMI-POB
Col Craig Clayton	Air Force Liaison to DAMI-POB
Joni Jarrett	TEC COTR
Steve Nolan	DAMI COTR, DAMI-PPM
Don Artis	COE rep to SARD, SARD-TR
Tom Killion	ARL rep to SARD, SARD-TR
Major R. Hamilton	SWO TRADOC
Judith Hanks	HQ TRADOC
Col Robert Allen	Deputy Director, Air Force Weather, AF/DXOW
Col Douglas Pearson	Chief, Policy/Procedures, AF/XOWP
Col Alan R. Schaffer	Assistant for Environmental Sciences, ODDR&E (ELS)
Major Mike Corbett	Chief, Weather Support Team, USAIC&FH
Mike Powell	Deputy Director, Combat Development Directorate, ISAIC&FH
Neil Griffin	ATZS-DOTD
LTC Howard Phelps	ATZS-DOTD
Capt Phil Crettol	326 th Military Intelligence Battalion
MSgt W. Buttner	Weather Support Team, USAIC&FH
Richard Szymber	ARL-W LNO to WST USAIC&FH
Capt. Roy Donelson	Weather Support Team, USAIC&FH
Dave Waldman	BCBL-H
James Harris	Chief, Artillery Branch, ARL-W
Dr. Doug Brown	Chief, Weather Exploitation Branch, ARL-W
Marvin Dubbin	Project Director, IMETS
Maj Dale Klein	Army Signal School LNO to ARL-W
Robert Dickensheid	Weather Exploitation Branch, ARL-W
Robert Endlich	Weather Exploitation Branch, ARL-W
Dr. Donald Hoock	Weather Exploitation Branch, ARL-W
Capt Ron King	AFW LNO to ARL-W
Charles Taylor	FA Specialist (Met), USAFAS
Dr. James Cogan	Weather Exploitation Branch, ARL-W
Bob Brown	Weather Exploitation Branch, ARL-W
SFC L.E. Evans	Artillery LNO to ARL-W
Lt Col Rich Bensinger	Air Force Liaison to DAMI-POB
Dave Sauter	Weather Exploitation Branch, ARL-W
CPT Robert McKendrick	326 th Military Intelligence Battalion
Robert Dodd	Battle Lab Integration, Technology, and Concepts Directorate, TRADOC
Maj George Howard	Weather Support Team, USAIC&FH
Dr. Julie Chesley	Management Consultant
Dr. Mike Wenger	Management Consultant
Major R. Hendrick	Concepts Division, ATSZ-DCD
Dr. Paul Krause	TEC

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APPENDIX E. ADDITIONAL COMMENTS/PROPOSED ACTION ITEMS

BACKGROUND

As part of this project, STC conducted a series of visits during which we observed many areas, received briefings on several topics, and discussed numerous issues. Because the primary purpose of this study was to study the weather support organization and not to investigate and analyze specific issues or problems, they were never fully investigated. Many of the areas raised by the authors contain questions. Many answers were not available because there were insufficient resources and time to investigate further, the people asked did not know the answers, or there was no satisfactory answer available. However, we felt that these issues were important enough to mention. Many of these areas were indicative of or the result of the lack of a cohesive weather support organization. Some of these issues may in fact disappear when a viable weather support organization is established.

In addition to the issues/problems recorded, there were easily 15-20 items which were not included because the STC investigators were unable to provide/develop even a little corroborating information. In an effort to organize the various information obtained and to relate it to the overall objective of this study—improved weather support organization and management—these observations (a brief review of the subject) and comments (ideas or suggestions about the subject) are listed alphabetically in Part I of this appendix.

In addition to the problems identified by the authors, members of the weather community identified other problem areas and suggested action items. These items are included in Part II of this appendix.

RELATIONSHIP WITH TRADOC REQUIREMENTS PROCESS

To organize these various issues and to relate them to the overall objective of this study—improved weather support to the Army—the information has been grouped into six areas. These are the well known Doctrine, Training, Leader Development, Organization, Materiel and Soldier (DTOLMS) areas of TRADOC and the Army's requirements process. The individual areas identified throughout the study and by various reviewers are listed in Table E-1, which also indicates how these areas are related to each individual DTOLMS area.

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Table E-1. Comments, Issues, and Proposed Action Items

	Doctrine	Training	Organization	Leader Development	Materiel	Soldiers
Part I. Authors' Additional Comments						
Army SWO Nontactical Positions		X		X		
Battlescale Forecast Model	X				X	
Communications	X					
Critical Values					X	
Exploitation of Commercial Capabilities					X	
FM 34-81	X					
Follow-on Weather Training		X				
Intelligence Preparation of the Battlefield		X		X		
Integrated Weather Effects Decision Aid (IWEDA)	X	X			X	
Marketing		X		X		
Modeling and Simulation		X			X	
Officer Branch Training (MIOBC, MIOAC, and Officer Transition Course)		X		X		
Owning the Weather		X		X		
Professional Military Education		X		X		
Tactical Decision Aids			X		X	
Training for Air Force Tactical SWOs		X				
Weather Risk Chart		X			X	X
Part II. Proposed Action Items from Army Weather Community			X			
Air Force Senior SWO Positions		X	X	X		
Air Force Staff Weather Officer			X			
Army/Air Force Weather R&D		X				
Coordination of Weather Actions		X			X	
IMETS Improvements			X			
Joint Senior Staff Relationships			X			
Staff Meteorologists			X		X	
Weather R&D	X		X		X	
Weather Requirements	X				X	
Weather Support to Aviation Battalions	X		X		X	
Weather Training		X			X	

PRIORITY OF ACTION

Assigning a priority for action to the items listed in Table E-1 is a difficult and complex process. Many of the areas are interrelated, some need to be, or can be, combined or implemented concurrently, while others can be only successfully implemented consecutively. Finally, many of the items must be continuously reviewed and are never really completed. Table E-2 lists actions items by priority realizing that many items could very easily be repositioned or combined with another action item.

Table E-2. Action Items List by Priority

PRIORITY	ACTION ITEM	
	Part I. Authors' Additional Comments	Part II. Proposed Action Items from Army Weather Community
1	FM 34-81	Coordination of Weather Actions
2	Critical Values	IMETS Improvements
3	Battlescale Forecast Model	Staff Meteorologists
4	Integrated Weather Effects Decision Aid (IWEDA)	Weather R&D
5	Tactical Decision Aids	Weather Support to Aviation Battalions
6	Officer Branch Training (MIOBC, MIOAC, and Officer Transition Course	Army/Air Force Weather R&D
7	Intelligence Preparation of the Battlefield	Weather Requirements
8	Modeling and Simulation	Weather Training
9	Communications	Joint Senior Staff Relationships
10	Army SWO Nontactical Positions	Air Force Staff Weather Officer
11	Follow-on Weather Training	Air Force Senior SWO Positions
12	Training for Air Force Tactical SWOs	
13	Marketing	
14	Owning the Weather	
15	Exploitation of Commercial Capabilities	
16	Professional Military Education	
17	Weather Risk Chart	

PART I

AUTHORS' ADDITIONAL COMMENTS

Subject: Army SWO Nontactical Positions

Observations: Army Staff Weather Officer (SWO) positions supporting non-tactical units, e.g., TRADOC Centers and Schools, are usually filled by non-volunteers. The Air Force has historically assigned officers who were either passed over to the next grade, were non-promotable to the next grade, or who planned to retire before becoming eligible for consideration. Also, most, if not all, SWOs retired from this assignment. Many officers assigned to Army positions do not want to come and do not understand the type of support required. They usually approach the job with a laissez-faire attitude. This assignment policy impacts not only the SWO but also the Army customer, who generally doesn't think about weather anyway and without the gentle prodding of a good SWO quickly forgets to include weather and weather effects in any planning.

Another problem facing Air Force officers being assigned to the Army is that those Air Force officers assigned as SWOs to TRADOC and TRADOC centers and schools do not normally receive any special training. Although they may attend the SWO course, that course does not prepare them for their work in the combat development (CD) arena.

Comments: Most officers assigned to these positions had little or no experience in Army weather support. The Air Force should change their assignment policy and/or authorization for TRADOC center and school SWO positions. Change authorizations to majors, and assign captains who are trying to get promoted to major. Or the Air Force should leave the 0-5 billets at the centers and schools and assign junior majors to the positions, those that still have a chance of promotion. In both cases, SWOs should have previous Army support experience.

The CD area should be a large part of the SWOs daily work load, and knowing what CD is and how it works will make it easier to understand how the Army "system" works. In addition to the training received on CD, the SWO will also make invaluable contacts in the CD community Army wide. This will help the SWO to "get the weather message across" a lot easier to people he met at the CD course.

The following information was obtained from the TRADOC CD web page in the spring of 1997:

"The Combat Developments Course is taught at the U.S. Army Logistics Management College, Fort Lee, Virginia. The course incorporates the new requirements determination process

and its relationship to Planning, Programming, Budgeting and Executive Systems. Students gain knowledge of the processes required to develop concepts, conduct studies, design organizations, and prepare materiel requirements. They also become familiar with various HQDA, TRADOC, and acquisition organizations with which they will interact.

Course dates are as follows:

6 May	-	22 May 1997
10 June	-	26 June 1997
5 August	-	21 August 1997
8 December	-	19 December 1997

Seats are available. Military and civilian combat developers may apply through regular training channels. The ATRRS course code is ALMC-CD. The CD course will be 2 weeks long beginning in FY 98. Offsite training is available. DCDs willing to pay the cost of bringing the course to their location should contact the CD course manager: MAJ Dwayne Riddle, DSN: 539-4490."

Subject: Battlescale Forecast Model

Observations: The Battlescale Forecast Model (BFM) is being developed by Army Research Laboratory (ARL)-W to be used in the integrated meteorological system (IMETS) and other similar systems to provide the microscale forecasting required by the Army. A doctrinal issue seems to be arising involving where and by whom the model should be run. The Army seems to think that it should be run at the lowest level that is needed, where the communications is available, and where the Army weather doctrine states it will be run. Air Force thinking is that a BFM should be run only at the theater level and above. AFW doctrine (not personally verified) is to produce all target forecasts at the Air Force Global Weather Center (AFGWC), thereby negating the need for the BFM in-theater at all. The ARL contends that the BFM, located at the tactical level will produce a consistent target forecast that is more accurate and available more quickly to the tactical user. However, the problem still remains, for the BFM to operate it needs good and reliable AFGWC data to be initialized.

The Army's primary requirements for atmospheric battlescale information is 2 km or less in the horizontal and the lowest 300 m of atmosphere above ground level. Neither the Air Force nor the

Navy can approach satisfying these criteria. Thus, the BFM is designed by and for the Army. With diagnostic tools available at ARL-W, the resolution of the BFM can be increased to 100 m.

One of the biggest (if not the biggest) defenders of the BFM is the Artillery and its new, developing artillery systems that are being designed to host the BFM on the gun platform.

Development of the BFM is in competition with the Navy's efforts to develop a microscale forecast model.

Comments: The doctrinal issue of where and by whom a BFM capability will operate needs to be settled. The Army, Navy, and Air Force need to resolve questions such as: Who will develop the model? Who will operate it? and Where it will be operated? And, since the Army is the customer, their requirements are paramount and must be satisfied.

DAMI-POB should be the Army lead to settle the inter-Service doctrinal issues. Both ARL-W and U.S. Army Intelligence Center, Fort Huachuca, Arizona, Weather Support Team (USAIC&FH WST) should also be key participants in these efforts because of their research and doctrinal responsibilities and interests. The support of DAMI-POB and the USAIC&FH WST is needed in the discussions with the Navy and the Air Force about the Air Force concept that mesoscale forecast should only be run at theater level or above.

Subject: Communications

Observations: Many of the weather support systems being developed today by ARL-W and other organizations have sophisticated communications requirements and require the transmission of huge databases to initialize their software and to transmit their products. Most of these new requirements have not been formally identified to the U.S. Army Signal community. In addition, many of these systems and their associated concepts of operations exceed the current Signal Corps capabilities. Historically, the mindset in the Army (and also in the Signal Corps community) is that weather is not important, therefore weather has received a very low priority for satisfying its signal requirements.

The recently completed Brigade XXI AWE at the National Training Center (NTC) is an example of both the increased need for communications by the weather support community and how weather people, not communicators, designed the weather communications support package. This exercise

also demonstrated the heavy reliance that weather, and in particular the BFM, has on maintaining a satisfactory link with the AFGWC.

Trojan Spirit is developed for and owned by the military intelligence (MI) community and is supposedly a multi-purpose system that goes down as far as the division. Apparently there is no formal (or informal) doctrine, procedure, or other regulation, for the use and flow of data on Trojan Spirit by the entire Army weather support community.

“Reach back” is an Air Force communications concept to bring weather data into the theater of operations. Does it work?? Can it support IMETS?

A developer for the Army Global Command and Control System (AGCCS) went to ARL-W for a Concept of Operations Meeting for IMETS and/or overall Army weather and the associated weather requirements. Apparently there is no formal approved document, however, DAMI-POB is supposedly working the issue.

Comments: The Achilles heel for Army weather support has always been communications. Several key questions need to be answered, for example, How should the weather communications requirements be stated to the Signal Corps and who should state them? Has anything been done to make use of or plan to make use of the capabilities of the MI system called Trojan Spirit since part of the justification for Trojan Spirit was to transmit weather data? Is there any doctrine for its use? Can the Tactical Exploitation of National Capabilities (TENCAP) world be exploited by the Army weather community to satisfy IMETS and BFM requirements? What is the Army weather support concept for AGCCS? What is the concept for getting AFGWC data to the Army users in the field? These and other questions must be answered and a Army weather support communications architecture designed if the technological advances being made in weather forecasting (the BFM) and weather effects (IWEDA) are to be fully exploited by the warfighter of the 21st century.

Subject: Critical Values

Observations: Discussions have been initiated with the Air Force Combat Climatology Center (AFCCC) in an attempt to make the AFCCC responsible for validating, maintaining, and distributing all Army critical values. This effort may not be totally supported by the USAIC&FH WST since they feel that the responsibility for the Army's critical values (CV) rests with the USAIC&FH WST and the Military Intelligence community.

Comments: The success of the IWEDA software program and the increasing sophistication of Army weapon systems and the associated increase in susceptibility to weather effects, makes the existence, maintenance, and distribution of an accurate, comprehensive validated critical value database more important. Therefore, three issues need to be completed: the CV database at USAIC&FH WST needs to be validated and maintained; the CV database at the U.S. Army Topographic Engineering Center (TEC) needs to be reviewed, validated, and combined with the USAIC&FH WST CV database, which would include all environmentally sensitive Army equipment; and a decision needs to be made concerning the turning over of the continued maintenance, and distribution responsibilities to AFCCC.

Subject: Exploitation of Commercial Capabilities

Observations: The U.S. Army Research Laboratory (ARL) issues Broad Agency Announcements (BAA) to solicit input from commercial vendors for their areas of interest. When developmental projects start or whenever they are looking for solutions to needs, the scientists/engineers do a market survey of the technical area of interest to identify the range of existing capabilities.

ARL-W works closely with other government labs to both exchange capabilities as well as potential solutions to common problems.

ARL-W receives unsolicited proposals from various commercial vendors that alert them to new capabilities.

The U.S. Army Space Command (ARSPACE), in their Army Space Exploitation and Demonstration Program (ASEDP) invites vendors with specific capabilities to demonstrate their systems and attempt to satisfy ARSPACE's requirements, including weather.

Subject: FM 34-81

Observations: FM 34-81 is a joint Army and Air Force publication that serves as the doctrine document for weather support to the Army. It is over 8 years old and reflects doctrine used and espoused by the Army that is almost three generations old (based on current revisions to FM 100-5). Following publication of FM 100-5 in 1993, a draft revision to FM 34-81 was prepared and started on the long tortuous trail to approval by both the Army and the Air Force. It was rapidly approved by the Army;

however in late 1996 the Air Force officially declined to approve the document, and based on the age of the draft, it was withdrawn from the publication process. Currently there is no official or unofficial Joint Service or Army-only publication that provides current doctrinal guidance on how the Army will receive weather support today.

Comments: Without a current doctrinal publication on how to provide weather support to the Army, Army weather support teams either do not provide proper and sufficient support or they go off on their own and develop their own doctrine and procedures. This approach can and does lead to chaos. Further, the Army user (customer) does not know what is available for use, so weather is neglected.

An Army-only draft doctrinal publication should be sent to both Army customers and Air Force Weather Teams. It must provide guidance on the doctrine and procedures for providing weather support using today's equipment to today's Army organizations. It should reflect the soon to be published FM 100-5. It should reflect some of the steps the Army is taking to move into the 21st century. And it should reflect how the Army fights its wars and manages its operations and peace-keeping assignments today. The guidance to the field must be updated *now*. The USAIC&FH WST should make this one of its highest priorities; it should collect a few very good writers who are experienced in providing weather support to the Army, and, using other existing documents (e.g., CONOPS, TTPs), publish the document in a few months.

Subject: Follow-on Weather Training

Observations: Currently no known follow-on or annual refresher training programs are offered by SWOs at any Army locations to MI personnel. It may be provided on an individual basis, but no formal USAIC&FH supported program exists. This type of training for MI personnel, both officer and enlisted, will augment and reinforce the training received in a school environment.

Comments: Consider developing a follow-on training program taught by the Division/Corps SWO to all newly arriving S2 officers. This program could augment the 2-3 hours of training that the S2 officers receive in their basic and advanced courses (or miss if no time is available in their very busy course schedule at Fort Huachuca). The content would be tied very closely to the Intelligent Preparation of the Battlefield (IPB) training requirement and how weather should be included in the entire IPB process. The course content could be developed by USAIC&FH WST in conjunction with the MI Officer Basic and Advanced Courses (MIOBC/OAC) at Fort Huachuca, furnished by USAIC&FH WST to the local SWO, and executed on the local level. This might require USAIC

(DCD or DOTD) to levy a requirement for this type of training. Since IPB is one of the 192 common core training skills, this training requirement could probably be legislated. Otherwise a good local marketing campaign could help the local SWO sell the need for such a program.

Subject: Intelligence Preparation of the Battlefield (IPB)

Observations: The IPB, which includes Weather, Enemy, and Terrain, is according to Army doctrine the responsibility of everyone in the Army, from soldier to general. Therefore it should be included in everyone's training. Based on evaluations of regular battalion rotational exercises held at the National Training Center (NTC) and as observed at the recently completed Brigade XXI exercise at NTC, the Intelligence community has recognized that field commanders and their S2s did not fully understand and use the IPB. Simply stated "The S-2 cannot do his job." Several proactive steps are being taken by the MI training community to address these issues. The actions include developing a training video about the "IPB Process - Enemy, Weather, Terrain;" development of a series of simulators and simulations; and the development of a New Systems Training Office. The Weather Proponency Office personnel at USAIC had not been included in the staffing, preparing, writing, and other duties associated with any of the actions to develop improved training packages for the IPB process.

The IPB is listed as one of the 192 common training skills of the Army. As part of this program, an exportable training program is being prepared at USAIC&FH for delivery to TRADOC by 30 June 1997.

Conversations with several personnel could not confirm the exact make-up of the 96B enlisted intelligence analyst course, but they expressed the concern that it lacked any reasonable exposure to weather effects information.

Comments: The teaching of the IPB to the 96B enlisted intelligence analyst should play a larger part in the curriculum and the amount of weather/weather effects should be expanded. This would provide another avenue to "spread the weather/weather effects gospel" and further develop the "weather culture" in the Army.

Increased proactivity by the USAIC&WST and greater command emphasis from USAIC&FH will help to improve the weather culture of the MI community and throughout the Army.

Subject: Integrated Weather Decision Aid (IWEDA)

Observations: The current version of FM 34-81, Weather Support for Army Tactical Operations, does not include any official doctrine or procedures for, or even any mention of, IWEDA. There is also no known unofficial doctrine on its use. Therefore, the inclusion of a "local rule editor" in some versions of IWEDA will create the potential for serious misunderstandings about the impact of weather on systems and operations among various levels of command and/or units.

Multiple revisions of IWEDA, both DOS and Unix based, exist in the field. Capabilities and rule bases are different.

Comments: A formal document should be published that contains guidance, doctrine, and/or procedures for the use of IWEDA. This document should be in addition to the currently available IWEDA User's Guide. This document should also include information concerning when and how to use the IWEDA rule editor following completion of the previous paragraph.

The DOS version of IWEDA currently in the field is out of date. It must be updated or removed from the inventory immediately.

The need for, implications of, and doctrinal approval of an IWEDA rule editor must first be resolved through coordination among at least the USAIC&FH, DAMI-POB, and ARL-W. Only after that has been done should the actual development and required code writing be undertaken.

The critical values database and rule sets that have been developed for threat systems need to be expanded to include a broader range of systems and operations. In addition to the normal threat systems, which are usually considered systems from the old Soviet block countries, information on systems available from U.S. allies should be included since they might be used by the opposing forces in small regional conflicts. Contact should be reinitiated with the National Ground Intelligence Center (NGIC) to establish the need for this information and to establish a priority for the completion of this effort.

IWEDA must eventually have enhanced capabilities such as the ability to zoom in on a specific area of interest and only see the weather impacts that impact that area.

Subject: *Marketing*

Observations: Marketing of weather to the Army appears to be in a positive position with a lot of momentum. The R&D community has delivered some very useful and saleable products (e.g., IMETS, IWEDA and other TDAs, and the Owning the Weather (OTW) concept). The present and potential capabilities of many of these programs were recently demonstrated at the BDE XXI AWE (Advanced Warfighting Experiment) at the NTC. However, no apparent overarching plan exists that contains the next phase of a marketing plan, and the momentum gained toward changing the Army's weather culture may be lost. For example, there are no coordinated plans to expand and integrate weather R&D or present weather capabilities with or into other Army programs (e.g., Battlefield Visualization, Information Operations, or other AWE).

Comments: An overarching (integrated) marketing plan needs to be developed. Not only must weather support be marketed in various publications and during isolated AWEs, but also at such schools as the operator-level branch schools and officer professional-level schools, and at the highest levels (e.g., Integrated Priority List developed by the Joint Requirements Operations Capabilities staff). The warfighting decision-makers must be shown how weather can be used to their advantage.

Subject: *Modeling and Simulation*

Observations: An Army regulation was issued in 1988 to organize Army's Modeling and Simulation (M&S) wargaming efforts. The worldwide acceptance and development of DIS-sponsored protocols increased the capability of various models to exchange key information. Weather protocols were developed as part of the DIS movement. The United States then dropped the DIS protocols because they were thought to be too restrictive and the HLA (High Level Architecture) protocols were developed instead. Limited numbers of models were combined into groups or "federates" that are able to talk to each other using the HLA protocols. HLA protocols are being used in the United States for support of various large-scale exercises (e.g., live play, virtual simulations, constructive simulations, virtual test grounds, and semi-automated forces).

The Battle Technology Lab of the BCBL-H is attempting to automate the IPB. Some weather has been included, but it appears to be more of the type of just parsing weather data as opposed to any conceptual integration of weather/weather effects into the decision-making of the IPB process.

As more sophisticated and varied models, simulators, and simulations are developed, the requirements for weather support are changing. In many cases few requirements for environmental support actually exist and these are usually for terrain support, not weather. There is an increasing need for weather impacts/effects in M&S versus putting in the actual weather. A lot depends on the type and level of simulator or model being used.

The TAOS (Total Atmosphere and Oceanographic System) is identified to act as a master server for all simulators. The Synthetic Theater of War uses TAOS.

The USAIC&FH, in a draft White Paper, identified three MI Simulation efforts for "enabling and training battlefield visualization for Battle Command." There was limited mention of weather or weather information in the paper.

Battlefield Visualization needs high resolution weather data; however, the weather normally takes a back seat to the need for and emphasis on terrain data.

Comments: The Integrated Meteorological System (IMETS) and/or IWEDA have potential for use in or support of models and simulators by providing weather effects information and/or small scale weather data (from the BFM). Simulations of specific weather patterns/events should be prepared for IMETS. They could be "captured" during actual weather events or manually prepared from climatology. These packages also could be used to train new weather people and as simulations or "canned weather" in command post exercises. A new requirement should be written to provide a new family of IWEDA products.

Defense Advanced Research Projects Agency and TEC have a weather server tied to the DOD master environmental library, a Navy-sponsored climatology on-line database.

More effort needs to be placed on supporting M&S of Army systems, situations, and operations so that more weather play is achieved. This will go a long way toward changing the Army mentality about weather. Simulation is the opportunity to influence Army attitude about routinely using weather in their decision-making process.

Subject: Officer Branch Training (MIOBC, MIOAC, and Officer Transition Course)

Observations: The MI officer has the overall responsibility for weather. Especially at units where a SWO is not assigned, normally below division level, the S2 is the source of and expert in weather, weather support, weather effects, and weather organization.

The Intelligence Officer Basic Course has virtually no student weather exposure even though the three tenets of the IPB process are Enemy, Weather, and Terrain. To help the student understand how weather support is provided, the students are referred to FM 34-81, Weather Support for Army Tactical Operations, which is technically, doctrinally, and organizationally outdated. To give them information on weather effects, a key responsibility of the S2, the students use FM 34-130, Intelligence Preparation of the Battlefield, which contains only a single page of weather effects. The students are required to complete a series of practical exercises using these references to include the application of weather effects information. These exercises are usually very basic and limited in their consideration of weather effects. The same dearth of weather effects exposure is found in the Officer Advanced Course (OAC). This is due in part to the scarcity of weather and weather effects training received in the Officer Basic Course (OBC). The level of weather knowledge of officers attending the Officer Transition Course is dependent in large part on the original branch of the student. The Cavalry Branch of the Armor School reportedly does a very good job of inculcating weather awareness, most likely because of the strong aviation influence.

Comments: Discussions with instructors and course supervisors revealed a willingness to make time available, a 2-hour block of time was mentioned, for the SWO to come in and teach weather and weather effects, especially during the IPB block. In addition, proactive participation by the WST would be welcome in developing and revising the practical training scenarios used in the IPB section. In addition, the OAC course supervisor agreed to give out copies of the draft FM 34-81-1, Battlefield Weather Effects, to his students, which will greatly expand their library of weather effects information.

When the architecture of the MI structure is taught in the basic and advanced MI courses, (and for that matter in any Army course) weather should be included as both a responsibility and as an integral component of the MI organization. The capabilities of the SWO and the weather team should be spelled out just like any other MI unit. The only difference is that these capabilities come from the Air Force and are attached, but should be an integrated part of the MI structure.

Subject: Owning the Weather

Observations: Owning the Weather (OTW) is a program initiated and developed by the Battlefield Environments Directorate of the ARL at White Sands Missile Range (ARL-W) to publicize and explain to the Army the potential advantages from using weather and weather effects information.

The OTW concept describing how the U.S. Army can and does use weather effects as a force multiplier and economic advantage has appeared in numerous publications and has received national exposure on a nationwide cable TV program. The primary force and voice behind the effort to publicize OTW has been Mr. Richard Szymber. He is currently attached in a liaison position from ARL-W to the U.S. Army Intelligence Center and School and to the Battle Command Battle Lab - Huachuca. The interesting item here is that Mr. Szymber performed most of this work while stationed at ARL-W well before he was assigned to USAIC as liaison to the WST. As a result, the publicity recently generated for weather has been aimed at the scientific developers at ARL-W, not the WST at USAIC. Further, the ARL leadership feels that the Owning the Weather Program has outlived its usefulness to ARL and prefers not to use the term any longer. However, OTW and variations of it still have much value to the U.S. Army at large as a publicity and teaching tool. At the same time that ARL sees decreasing utility in the OTW program, the Air Force Weather community has adopted the OTW concept and is aggressively starting to use it in their educational and marketing efforts.

Comments: The OTW program should be allowed to grow and expand away from just an advertising mechanism for the R&D community. It is much more than that. Integrated into a overall weather marketing plan that will increase and expand its exposure, OTW can become the cornerstone of the efforts to develop a viable weather culture in the Army.

Subject: Professional Military Education

Observations: There is little if any real weather and weather effects training offered in any of the Army's professional military education programs.

Comment: Army Officer professional development needs to be reviewed. There maybe an opportunity for the Army Weather Support Organization to do both training (e.g., Weather in the IPB, the importance of weather effects) and marketing (give a demonstration on weather support or specific weather products, e.g., IWEDA). Both C&GS (Command and General Staff College) and TCDC (Tactical Commanders Development Course) are candidate courses for revamped weather sections. Coordination (visit) with the Combined Arms Center (CAC) and the CAC SWO needs to take place.

Subject: Tactical Decision Aids

Observations: With the rapidly improving speed and versatility of personal computers (PC), the increased use of small portable PCs by members of Army organizations, and the increased dependence on computers for C4I, the use of and importance of weather tactical decision aids (TDAs) is rapidly expanding. Weather-related TDAs are being developed by many organizations from Aviation to Special Forces. However, currently there is no single, active coordinator for TDAs. With few exceptions TDAs are developed locally and only limited exchange among potential users (or even developers) ever occurs. TDAs developed by one TRADOC center or school are not automatically exchanged with other schools. Some exchange occurs during the annual Battlefield Atmospheric Conference sponsored by ARL-W. However, this exchange is usually limited to the scientists and engineers who develop the TDAs and not the operators or tactical users who could possibly make use of someone else's TDA, since few operators usually attend the conference. Some very small-scale work on developing a TDA library may be in the process, conducted by the ARL-W liaison to AFCCC. In addition, the ARL-W has a library of a number of TDAs since it is the primary developer of many existing TDAs.

"Mercury" is an Artificial Intelligence program developed by ARL-W to read observations and develop short-range forecasts that can be used in the production of heat stress TDAs.

Control of the technical goodness of TDAs is very important. The requesters of a TDA are the validators because they have to decide whether or not it meets their intended purpose. The developer of the TDA provides verification if it is scientifically sound, but accreditation must come from an independent test and evaluation facility.

Comments: The use of weather tactical decision aids will continue to increase and become a more important part of Army operations. Therefore, a formal, or at least routinely occurring set of procedures needs to be in place to coordinate future TDA developments. A central library or catalog of available TDAs is required.

Subject: Training for Air Force Tactical SWOs

Observations: Air Force officers assigned to positions supporting Army tactical organizations have almost never had any Army support experience. Therefore, some type of training, before they go

support the Army is needed. The current SWO course helps to prepare those SWOs who attend, to understand the Army and do their job as a SWO to a tactical unit a little better. One problem though is that all new SWOs do not attend that course.

The SWO course taught at Fort Huachuca does not include a major block of instruction on the IPB process.

Comments: The tactical SWO needs to understand the Army, the actions and responsibilities of a division staff officer, and the roles and missions of the MI officer. The current SWO course offers some of the necessary training, however it lacks key ingredients. To broaden the training received by the SWO and increase the exposure received to other Army officers, all new SWOs should attend the MI Transition Course for officers transferring in to the MI career field. If course length or class space becomes a problem, then the current SWO course could be modified to integrate with the transition course at several key junctures. It could also be made exportable.

Subject: Weather Risk Chart

Observations: A risk analysis chart has been developed (or may be just used—it could have been developed at CAC) by various units at Fort Huachuca that incorporates weather into the decision-making process by squad leaders. A copy was obtained from the 111 MI Training Brigade.

Comments: The existence and use of this weather risk chart is another example of getting weather effects information into the hands of the soldier. The only problem, the USAIC&FH WST did not know of the chart and it was not included in any of the educational or training information they distributed. This chart should be included in the weather marketing plan for continued distribution and use by soldiers. It should also be immediately distributed Army-wide by USAIC&FH and the USAIC&FH WST.

PART II

PROPOSED ACTION ITEMS FROM THE ARMY WEATHER COMMUNITY

Subject: Senior Air Force SWO Positions

Comments: The new O-6 at FORSCOM is not authorized (currently over-manned by the Air Force Directorate of Weather, Office of the Vice Chief of Staff for Plans and Operations [AF/XOW]) and does not have clear lines of authority to work operations level issues with the FORSCOM corps and division because of the chain of command of the Air Support Operations Group (ASOG) going through XVIII ABC. The FORSCOM SWO at O-6 level needs to have a direct relationship with ACC/DOW to work Army operational weather issues.

Proposed Action Items:

1. Assign O-6 as SWO to TUSA and change the requirement for TUSA to be authorized as an O-6.
2. Change Air Force chain of command to put FORSCOM under ACC/DOW to work operational weather support to the corps, divisions, ACRs, and ARNG. (Remove from ALO chain).
3. Maintain FORSCOM SWO position on Major Air Force Command (MAJCOM)/DOW O-6 level meeting with AF/XOW.
4. Suggest that DAMI-POB ask AF/XOW to establish an Army weather cell or office in the new AFWA at Offutt AFB, who will be the overall liaison and coordinator on Army support activities to ensure continuous information flow between Army PMs, TRADOC, and MACOM G2s. Air Force personnel assigned could be housed with the MI analyst requested by AF/XOW from DCSINT.

Subject: Air Force Staff Weather Officers

Comments: Another factor contributes to the lack of culture. Army commanders have OPRCON of the SWOs by AR 115-10/AFJI 15-157, and control the Air Force Weather Teams (WETM) in contingencies and war according to FM 34-81/AF JPam 15-127. But the Army Commanders do not rate (OPR) these officers, who are under the Uniform Code of Military Justice (UCMJ) and administrative control of Air Support Operations Squadron (ASOS) or ASOG commanders. Finally, the Air Force Weather O-6s, who had been SWOs at all the MACOMs and interacted with senior leaders, were lost in the transition from the Air Weather Service (AWS) to ASOS/ASOG and

replaced by ASOG (ALO) O-6s. This lack of direct senior-level interaction helps slow development of an Army weather culture. The AF/XOW has restored an O-6 at FORSCOM, but it is out of hide by overmanning an O-5 authorization rather than getting an authorization. However, several recent good recommendations have come from this relationship at FORSCOM. The FORSCOM SWO is under the administrative command and control of the ASOG Commander at XVIII Airborne Corps, thus reversing the normal Army chain of command.

Proposed Action Items:

1. Suggest DAMI-POB ask AF/XOW to investigate Army SWO promotions and ability of the Corps/Div/ACR commanders to rate their SWO with the Air Force as Senior raters.
2. Ask AF/XOW how to overcome the lack of volunteers at key SWO locations and provide critical continuity.
3. Recommend developing with AF/XOW a method to get advanced training for SWOs at Army CAS3, CGSC, and AWC to build a cadre of Air Force Weather (AFW) Officers with proclivity for Army operations and expertise in Army weather support.
4. Suggest that DAMI-POB work with AF/XOW and the Air Force Manpower system to assign a special experience and identifier to Army weather support to fill key Army positions in a systematic way.
5. Recommend the FORSCOM SWO be moved out from under XVIII ABC ASOG Commander and placed under the weather functional equivalent level at ACC/DOW, where synergy between the weather staffs can help the Army prepare its forces for their tactical weather missions.

Subject: Army and Air Force Weather R&D

Comments: With the SWO doing many Army functions, the line between Army and Air Force responsibilities has been diffused. Under the Defense Technical Applications Program (DTAP), Army R&D has responsibility for the development of small-scale models for transport and diffusion, which has clouded the lines of responsibility between the Army and AF. To clarify roles and responsibilities there needs to be the clear-cut split between Air Force and Army responsibilities.

Proposed Action Items: Revise AR 115-10/AFJII 15-157 to show the Air Force provides all hardware and software for tactical weather support within IMETS and outside IMETS (sensors) just as they

currently provide in garrison support today at Army Air fields. The Air Force would provide the complete weather forecaster workstation and Army would provided the IMETS interface with ATCCS to do tailored weather effects for Army warfighters. This means the Air Force will provide a detailed, mesoscale forecast at 10-km resolution in the near term and 1-2 km planned for the far term. Forecasts will be made at the hub and transmitted by the Air Force or DII communications to feed the AF-provided weather forecaster workstation in IMETS. The Air Force also will provide the small tactical terminal (STT) to intercept high resolution geostationary and polar orbiting imagery and environmental data records (EDRs) to measure soil moisture and provide vertical profiles of weather elements for artillery fires, chemical officers, and target area met for ATACMS smart munitions support.

Subject: Coordination of Weather Actions

Comments: Although weather intelligence is defined as weather, enemy, and terrain, and although USAIC&FH is the TRADOC weather proponent, the advantages of a robust capability to exploit weather information for tactical advantage of the warfighter has not been well understood in the Intelligence community, and has not been proliferated through training and doctrine in the Intelligence school and the other combat and combat service branches. Without the continuity of weather subject matter experts (SME) on the staff of the TRADOC schools and center, the consideration of weather in each school's DTOLMS is often unintentionally overlooked.

Proposed Action Items:

1. Ensure changes in FM 34-81 (97 draft) are coordinated in corps, division, Aviation, Chemical, and Engineer School FMs.
2. Review the old exportable training package and update it with the capabilities of IMETS/IWEDA.
3. Identify a Combat or Training Developer in key schools and bring them to USAIC&FH TDY for initial training. Provide them additional training materials and latest weather updates on AFW changes, doctrine, combat development through a Weather SME home page as part of the USAIC Weather Home page. (The home page would have other sections for other ICTs, and general weather information for coordination).

Subject: IMETS Improvements

Comments: In the Army combat arms, the lack of weather culture is part of a lack of full understanding of the potential advantages of improved weather support: much better forecasting from Air Force hubs and centers and better weather effects from IMETS decision aids. Warfighters do not see in part because of the lack of reliable tactical communications for individual Block I IMETS fielded around the world. If the IMETS can become a working part of every division/aviation brigade training exercise, the Army will learn to use TDAs and be able to act on the value of improved weather forecasting, thus leading to a real understanding and the start of an Army weather culture.

Proposed Action Item: USAIC&FH as combat developer direct PM IMETS to investigate using DirecPC as a means of communicating from AFWA to individual IMETS in CONUS and Europe for Training. Buy the DirecPC receivers through IMETS program and support it with O&M funds. CAC SWO build IMETS/IWEDA software into BCTP. ARL/BE Division apply IWEDA displays to Battlefield Visualization requirements as guided by USAIC&FH, as a first step in weather BV. Build the culture by giving hands-on experience in using tactical decision aids in the training programs.

Subject: Joint Senior Staff Relationships

Comments: The lack of an Army Support Weather Wing or equivalent organization historically has not enabled Army support problems to be worked at the same level of detail and urgency as Air Force problems identified by Air Force Weather Wings to Air Force problems. Under the new AFW organization, DAMI-POB now has the equivalent relationship on the AF/XOW O-6 level meeting and staff councils.

Proposed Action Item: Formalize the DAMI-POB role with a renewable MOA between Brig. Gen. Lewis and LTG Kennedy.

Subject: Staff Meteorologists

Comments: Reductions in manpower have been too extreme to maintain a minimum level of weather management expertise in the TRADOC system of centers and schools. The loss has limited

capability to establish the combined arms weather support deficiencies and to manage solutions within the DTLOMS.

- a. The Army meteorologists at INSCOM, HQ TRADOC, CAC, USAFAS, and USAIC&FH have all been eliminated. This occurred in the mid-1980s for INSCOM and HQ TRADOC and in the past few years at CAC, USAIC, and USAFAS.
- b. Weather support is a complex business to understand. This Corps of Army meteorologists (identified in (a) above), backed by ARL and COE research communities, previously had the potential to maintain continuity when Air Force and Army personnel changed. They could coordinate within TRADOC to identify requirements and work solutions across the BFAs. Without the continuity of the Army meteorologists and routine changes in Army leaders, the Army has slowly fallen into a situation where "you don't know what you don't know." With this Army meteorological infrastructure gone, the chance to mature Army understanding of the value of weather support and capability to defend programs to deliver OTW capabilities has decreased significantly.
- c. TRADOC SWO often go to the Intelligence School and CAC as a terminal assignment. The Air Force fills TRADOC SWO positions through its volunteer reassignment system. Underlaps occur almost every time a vacancy is created. The new SWO can arrive after long under laps. The volunteer SWO can also be without a strong Army background and experience. Yet, the SWO is expected to be planning the future weather support concepts, programs, doctrine, and organizations. Without an Army meteorologist to provide some continuity, new SWOs are charged to do an Army support job and often provide answers based on Air Force experience with traditional AFB support.

Proposed Action Items:

1. Establish an Army meteorologist at USAIC&FH as soon as a new hire can be approved. The meteorologist would work with DCD to help with IMETS, AMSS, and future program development. A USAIC&FH full time meteorologist can go to TRADOC schools and provide a long-term continuity not previously provided.
2. Provide an overview of weather to senior Army leaders about the potential values of OTW capabilities as an Intelligence initiative (G2 conference and other GOSCs).

3. Change USAIC&FH Intel Doctrine to make Weather an "INT" like other key Intel function. This will allow weather to be worked automatically as a part of every major intelligence action. This includes the Army Intelligence Master Plan, and all other planning and programming.
4. Reestablish a meteorologist at USAFAS . The Battlescale Forecast Model is used in the Profiler, therefore a meteorologist rather than an upper air technician is needed to understand how to integrate IMETS forecasts into artillery forecasts.
5. Establish a Army meteorologist at the Maneuver Support Center, Fort Leonard Wood, MO so that Engineers and Chemical Officers have the scientific expertise to apply the advanced weather information from IMETS models and decision aids to apply in the IPB and chemical hazard prediction.

Subject: Weather Requirements

Comments: Without an enduring weather culture in the Army fighting force, the opportunity for weather to succeed in providing new weather effects information has been very limited. However, BTF XXII and DIV XXI activities as part of Force XXI AWE have been a start. The long-range goal is to institutionalize the effective use of weather information within Intelligence and other combat arms branches. The Commanders in Chief (CINC) have not identified critical capabilities in their annual Integrate Priority List (IPL). The SWOs at most commands are captains or majors involved with direct mission support and may not actively participate in development of the CINC IPLs. Therefore, weather requirements from the field are not raised to a sufficiently high level to drive programs to meet those requirements (TRADOC and DCSOPS). By raising weather requirements high enough to be part of the CINC IPL, a greater level of effort can be applied to building specific solutions and indirectly enhance the culture. In the end, to create an Army Weather culture will take a coordinated training effort at all levels, enhanced by continued use of weather systems in the field to make warfighting capabilities more effective.

Proposed Action Item: Suggest that USAIC coordinate with MACOM G2s to identify weather requirements in the CINC IPLs. High priorities are IMETS tactical communications from the AFWA global center to all IMETS for training purposes, and to develop remote weather observing capability to support unattended measurement for deployments into contingency areas (Sava River precipitation measurements during Bosnia).

Subject: Weather R&D

Comments: The lack of culture on the Army's side extends into R&D. Program Managers do not have Air Force Staff meteorologists as part of their development teams. In Air Force programs, major developments have a staff meteorologist as an adviser. Knowledge of weather limitations is a factor in the development of each aircraft, weapon, and sensor. In Army programs, there are no Army staff meteorologists as advisers. AR 70-38 is outdated, but still does not require full consideration of real weather conditions in testing programs. Draft revisions of the AR 70-38 proposed putting a COE scientist/engineer on the ICT/IPTs and PM staffs to assist with integrating weather into weapons development. Lack of clear, enforceable guidance to test for adverse weather conditions in the DOD Dir 5000 series left the Draft AR 70-38 unsupported and incomplete. Proposals in draft AR 70-38 to use COE scientists to be advisers to major programs never came to the PM of the major programs. The TECOM Meteorological (Met) Teams have the potential to play a key part in establishing weather effects critical threshold values. The TECOM Met Teams at the Army ranges and R&D facilities collect some critical weather effects threshold values. They should continue to complete models of the atmosphere over the ranges to ingest output of the several weather sensors. This model will enable the Met Teams to make a complete description of the weather conditions during a test. The TECOM Met Teams can play a valuable role in the effort to complete a weather effects critical value database from which weather effects TDAs are built. TECOM should use the models to provide the critical values to USAIC, who creates the comprehensive list for TDA development.

Proposed Actions Items:

1. Suggest that USAIC&FH sign a MOU to get classified and unclassified weather effects critical values during routine Met Team testing.
2. Suggest that USAIC&FH continue to work with AFWA and AFCCC to establish NCDC, Asheville, NC as the joint archives for Weather Effects Critical Threshold Values. USAIC&FH should establish a MOU with USMC, Navy, and Air Force to include all Services critical values.
3. Suggest that DAMI-POB ask the COE review the AR 70-38 to add the responsibility to provide an Army scientist to advise PMs of major systems on weather effects (e.g., Air Force Staff Meteorologists).

4. Develop a process to direct laboratories to build prototype weather effects TDAs for USAIC to mature with the TRADOC school proponent for the system supported. For example, USAIC is working with USAAVNC on IMETS weather effects information to go into the Aviation Mission Planning System.

Subject: Weather Support to Aviation Battalions

Comments: The Army recently told the Air Force that Aviation Battalion (78) have direct support requirements but the Air Force has not developed a plan to support it. Transportation Group, Psyops Group, and Aviation Battalion are emerging requirements. The ACC has resourced 7th Transportation Group, but Special Operations Forces has not done the same for Psyops Groups, and AFW is working Aviation Battalion.

Proposed Action Item: Coordinate the CAC SWO with the Transportation School and HQ TRADOC to change the HHC TOE of the 7th Transportation Group to authorize tactical equipment for the WETM based on its mission statement. Also coordinate with AF/DOW, USAIC, and HQ TRADOC to transfer Division MTOE/TOE to Aviation Brigades for Aviation Battalion within the Division Aviation Brigades.

Subject: Weather Training

Comments: Weather section trainers at the Intelligence schools have written Weather POIs for OBC/OAC (Maj. Fleming in the early 1990s), but weather has not been rated high enough to get officially integrated into a curriculum under pressure to reduce the course load. Individual efforts of the Weather Section to work with individual instructors in the Fall of 1997 is a good initiative and should be increased in other classes and Precommand Courses (PCC). Weather training in PCC will help new senior leaders understand the opportunities the OTW concepts provide. Similarly, the exportable training packages (ETPs) showing advantages of using weather effects information for specific combat arms have not been developed and provided to the other TRADOC schools. Efforts in MIOBC and MIOAC can be used to develop an ETP, which will help branch instructors teach the advantages of tactical decision aids (TDAs) to show the weather effects on weapon systems, soldiers, and operations. There is an inherent interest in each of the combat arms, most recently shown at the Infantry School, which is developing a weather sensor in the Dismounted Battlespace (DBS) Battle

Laboratory (BL). The DBSBL seeks to protect its soldiers from extreme weather and to adjust weapons and capabilities to weather conditions.

Proposed Action Items:

1. Suggest that DAMI-POB add IMETS and Weather Effects information to DCSINT presentation at PCC.
2. Suggest that USAIC direct to Project Director, IMETS the requirement for the Mercury evaluation program, for injury caused by cold and heat, be included in IMETS and MCS software in a client-server relationship.
3. Continue carefully tracking of the DBSBL surface weather sensor by the Intelligence Center in order to take full advantage of the latest miniature electronics and technology to provide an Automatic Meteorological Sensor System (AMSS) capability. It should be coupled with Army Space and Missile Command (Army Space Battle Lab) demonstrations to use SATCOM command, control, and communications linkage from a remote surface weather sensors to IMETS. This in turn can feed local IMETS or AFW mesoscale models to produce better TDAs.